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THE CHEMIC PROBLEM IN NUTRITION

(MAGNESIUM INFILTRATION)

A SKETCH OF THE CAUSATIVE FACTORS
IN DISORDERS OF NUTRITION AS RELATED
TO DISEASES OF THE NERVOUS SYSTEM

BY

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THERAPEUTIC INDEX AND GUIDE," "MULTITOXINE FOR
TUBERCULOSIS," "TYPICAL TUBERCULOSIS,"
"MAGNESIUM INFILTRATION," ETC.

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JOHN AULDE, M.D.

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PREFACE

IN a sketch, confined to the study of a single factor associated with health maintenance, there are difficulties as well as dangers. Too much stress may be placed upon the premises, in which case the superstructure is not properly supported; hence, the dangers arising from unwarranted deductions. Again, a series of didactic essays, elaborating a new and novel principle in the treatment of disease, no matter how scientific their character, would fail to command attention unless amply confirmed by suitable evidence; hence, the demand for clinical reports, the crucial test of adaptability, a plan which has been followed in so far as appeared necessary to establish the claims advanced in respect to diseases of the nervous system.

As a preliminary to this discussion, however, it was deemed the part of wisdom to take a cursory survey of the ground to be covered—under the head of “General Considerations”—later, taking up more in detail, “Disorders of Nutrition.” For example, in studying the fundamental basis underlying the development of any disease, we must endeavor to obtain all possible data, to the end that the deductions shall be warranted by the facts adduced. Now, admitting that diseases of the nervous system are dependent upon impaired nutrition, it is necessary that we should have clear conceptions relating to the various functions incident to normal life.

These topics are conveniently arranged under appropriate headings for the purpose of developing the importance and

significance of the chemic deviation designated magnesium infiltration, sufficient evidence, scientific and clinical, being presented to confirm the claims advanced; and instead of formal statements, arbitrary and dogmatic assertions, the arguments have been couched in language well within the understanding of a select class of readers—such an element as it is assumed would derive personal advantage from the contained information.

Inasmuch as the belief is prevalent, if not universal, that animal life is a constant struggle with germs, it may be well to clear up this obscure question.

Germ life and germ activity—in the production of disease—have always been with us, and had we failed to learn the lesson taught by cleanliness, plagues like those of ancient times would to-day scourge the population throughout the world. There is a suspicion lurking in the minds of some intelligent people—including even physicians—that many diseases are not due either directly or indirectly to bacterial invasion, and as we shall see presently, there is a chemic deviation incident to all diseases, acute and chronic, functional and organic, infectious and non-infectious, which modifies—increases or diminishes—their severity. Alkaliescence of the body fluids—blood and lymph—and tissues, is the pivot or turning point between health and disease, whether due to bacteria or otherwise, and a solution of this mystery, which is the chemic problem, affords a most encouraging outlook for the conservation of health and longevity.

The story of bacteria is more than entertaining; it is fascinating. It was Virchow, the celebrated German pathologist, who demonstrated the leucocytes, or white blood corpuscles (1858); then came Pasteur, the Frenchman, an inorganic chemist, who twenty years later, discovered the bacteria.

A few years later, (1882), Metchnikoff, a Russian and a zoölogist, at Messina, Italy, first published his new theory of inflammation—that congestion (at a wound), was due to the concentration of certain white blood corpuscles (phagocytes), their special function being to overpower or destroy the invading microbes. That alkalescence promotes leucocytosis is now a well known clinical as well as scientific fact—although not previously applied in practical medicine.

Metchnikoff's discovery was accepted as the missing link, and while the deductions have not been invalidated by subsequent investigations, other potential factors of peculiar significance have since been discovered and demonstrated—a synopsis will materially aid the reader in determining both the relative and absolute value of alkalescence as an antagonist to bacterial invasion.

In diphtheria, for example, we must assume that nature provides, perhaps through the medium of these white blood corpuscles—some occult, chemic substance which neutralizes (destroys), the poison produced by the special bacteria, that is, **an antitoxin**. The bacteria themselves are not poisonous; it is their toxin which causes inflammation and interferes with nerve conduction. Antitoxin can be prepared artificially, and has proven remarkably efficient—when employed in the early stage of the disease—the suggestion is advanced here that remedial measures conducted for the purpose of maintaining approximately the normal alkalescence would add to the efficiency of antitoxin treatment.

Bactericides are employed to kill the germs and thus diminish germ multiplication. To Lister belongs the honor of first employing these substances in surgical operations—as antiseptics—but this plan was discontinued when it was

found that strict cleanliness was quite sufficient to prevent suppuration. Internally, of course, we have the antiseptic produced by the white blood corpuscles, and their efficiency is notably augmented by maintaining alkalescence.

Bacteriolysins are "anti-bodies" formed by the union of two separate substances, complement and addiment; they act upon the bacteria, dissolving them, and necessarily, their production will be favored by alkalescence.

Agglutinins show the reaction of the organism to bacterial invasion; that is, they develop a measure of the capacity for resistance by producing "clumping" of the germs. In typhoid fever, for instance, so long as we can maintain normal cellular activity, by means of alkalescence, the clumping persists—and the case remains mild.

Opsonins, the most recent addition to our list of antagonists, have the disadvantage of requiring skilled technique for their demonstration, in consequence of which their intrinsic merits may not be fully appreciated. The word opsonin is derived from the Greek, and means "to make palatable." Thus, when the opsonic index is high, the bacilli are more susceptible to phagocytes than when the index is low, but so far as can be learned, these investigations have been conducted without reference to the chemic status of the blood. Indeed, a controversy has arisen between Wright, the discoverer, and Metchnikoff, the veteran, as to what the opsonic index actually shows. The former claims that they augment bacterial susceptibility, while the latter insists that they stimulate phagocytosis.

Fortunately, the theory that alkalescence is antagonistic to bacterial invasion not only proves that both are correct in their deductions, because alkalescence does precisely what each claims, but it also harmonizes all the numerous

contentions, acrid and friendly, which have been going on now for more than a quarter of a century.

The following tabulation is appended as a convenient diagram for reference, since alkalescence gives promise of becoming an important factor in the treatment of disease.

ANTAGONISTS TO BACTERIAL INVASION.

1. **Leucocytes** . . (Phagocytosis)—Destroy (ingest) the germs (Metchnikoff).
2. **Antitoxins** . { Artificial (Behring);
Normal—Neutralize germ products (toxins).
3. **Bactericides** . { Artificial (Lister);
Normal—To kill the germs—*in situ*.
4. **Bacteriolysins** { Complement;
Addiment—Dissolving the germs (Pfeiffer).
5. **Agglutinins** . . Produce clumping of the germs (Widal);
6. **Opsonins** . . { Augment bacterial susceptibility (Wright);
Stimulate phagocytosis (Metchnikoff).

That the maintenance of all these vital functions in their integrity depends upon alkalescence is well shown in the following tabulation:

SUMMARY.

Alkalescence	{	1. Promotes leucocytosis;
		2. Increases anti-bacterial properties of the blood;
		3. Diminishes germ multiplication;
		4. Favors production of "defensive proteids;"
		5. Augments cellular activity—meaning greater supply;
		6. Lessens bacterial virulence.

"Finger-prints," first proposed, and later systematized, by Sir Francis Galton (1892), as a means of personal identification, is almost absolutely safe (reliable), the "chance" of two identical finger-prints being less than 1 in 64,000,000,000. Now, as a matter of clinical evidence, the chemic deviation known as magnesium infiltration is almost as certainly and positively demonstrable—first, by means of the palpable

changes (reactions), present in the body fluids, taking the saliva as a guide, or the disordered condition of the nervous system, by an investigation of the reflexes. In the second place, we have the defective secondary assimilation, along with the "nervousness," irritability, or what not, in proof of the first proposition; and third, we have the evidences confirmatory of both—in the results of treatment conducted for the sole purpose of correcting the assumed chemic deviation.

Back of this, however, lies the *primary or causative factor*, which being removed, or corrected, the untoward effects will disappear. This, of course, has to deal with the digestive apparatus, or primary assimilation; hence, the first lesson to be learned in order to secure permanent results relates to the digestive capacity.

Thus, in all disorders we have but two factors—the cause and the effect; and while it is always necessary to remove the cause, it may be expedient or even advisable to afford temporary relief by means of treatment calculated to ameliorate or modify the effect of chemic deviation. Fortunately, in this instance, cause and effect are so intimately related and interdependent, that medication may be conducted for the two-fold purpose—many of the reported cases will show the symmetry and completeness of treatment in this particular and emphasize the claim for efficiency and simplicity.

In *neurasthenia* with its multiplicity of symptoms, all due to functional changes incident to the chemic deviation, treatment directed to the primary cause, impaired digestive capacity, leads to the most favorable results. In neuritis, neuralgia, magnesia heart, chorea and infantile paralysis, however, we must not only remove the effect—in the form

of inorganic deposits which impede, hinder, or destroy the capacity of the nerves for the uninterrupted transmission of impulses—but we must also remove the original cause. No strict line of demarcation should be drawn, however, since the correct treatment of one factor is always attended with more or less benefit to the other, direct or indirect, immediate and remote, so that we avoid the complications incident to the use of anodynes, narcotics and hypnotics.

While the trend in medical science has been “upward and onward,” medical art has been vacillating and unsteady, or “wabbling” in its course—due to lack of a fundamental basis—but *the working hypothesis* here presented, together with our knowledge of bacteriology (biology), gives promise of the dawn of a new era upon the medical horizon.

In conclusion then, these teachings should be regarded as an exhibition of “*potisivism*,” the French substitute for scientific—knowledge derived from fact and evidence, rather than from intuition and tradition. And finally, the writer takes this opportunity to thank his colleagues for their continued interest in his work, and also for their patience in awaiting the promised publication.

THE AUTHOR.

PHILADELPHIA, SEPTEMBER, 1912.

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GENERAL CONSIDERATIONS.

A New Disease (?)—Art and Science—Discovery and Invention—Definition—Physiology and Pathology—Function of Cells and Reactions—Questions for Discussion—Invasion and Recovery—Summary.

A New Disease (?).—We are surprised at the wonderful results attained by scientists in the development of labor saving devices on a commercial basis, and we cannot resist the temptation to speculate as to the outlook for even greater achievements in the future than in the past, since the field for experimental investigation is almost unlimited, free and open to all who choose to take an active part in this laudable work. So in the domain of medicine and surgery, announcements of discoveries and inventions are of almost daily occurrence, all having utilitarian objects, and it is interesting to note that such announcements, not infrequently, appear simultaneously in different countries, occasionally from different localities in the same country, showing the altruistic trend in medical thought as well as the disposition to follow certain lines—in other words, to follow tradition, or meet a public demand? In ancient times, all innovations were decried and condemned and their authors punished, the penalty being determined by the seriousness of the offense. But things have changed under modern views. In medicine as in other sciences, all claims, novel and new, are promptly submitted to scientific and clinical tests for verification. Hence, the inquiry—Is “magnesium infiltration” a new disease or merely a discovery?

Before taking up this question, a word should be inter-

polated in order that the reader may understand definitely the difficulties in the way of progress in the treatment of disease, not the least of these being the lack of general intelligence on the part of the public, although this objection no longer holds good, as "the school-master is abroad."

Art and Science.—The present position of medical science has been attained only through a devious and circuitous route, and numerous by-paths have been more assiduously and earnestly explored than the main thoroughfare. However, the record of this haphazard work is not without value, since it enables us to avoid the quagmires and pitfalls which beset our forebears.

In the modern treatment of disease, science has largely supplanted art, with the result that mere symptoms are set aside, unless the indicated pathologic conditions can be demonstrated and confirmed by chemic or physiologic tests, or microscopic investigation—in short, with mathematical precision. As a consequence, diagnosis is definite and positive—rarely are parents now satisfied with a brief report to the effect that a child has a "touch of diphtheria," a "slight attack" of tuberculosis, or is "threatened" with typhoid fever, because they know that medical science is not compelled to hazard an opinion in this class of disorders. Indeed, dereliction on the part of the medical attendant may not only jeopardize the lives of a whole family, but an entire neighborhood may thus be endangered. Under these conditions, the State or municipal authorities take a hand—for the protection of the public as well as the family—compelling the doctor to comply with the law and discharge his duty by determining the disease at the earliest possible moment. Thus science is the foundation for law—for public protection, or public good—establishing safety for the millions, an achievement utterly impossible under the unstable and vacillating dictum of art. Still, without art to adapt medication to the varying demands of the system when invaded by disease, the doctor would be seriously handicapped—as will be shown in discussing "invasion and recovery."

Discovery and Invention.—There is a wide distinction between discovery and invention. Thus, Harvey's name is immortalized because of his discovery of the circulation of the blood; since that time, numerous inventions have been brought forward, enabling us to study in detail not only the movements of this fluid, but also the physical condition of the entire circulatory apparatus. The discovery of the specific infection in diphtheria resulted only after long and bitter controversy. It was claimed that if any sore throats were diphtheritic, all must be of the same character, differing only in severity. Finally, Prof. Loeffler of Germany, isolated the bacillus and demonstrated its special characteristics, as distinguished from the streptococcus infection, the latter being pyogenic (pus-producing), but non-infectious. Not only this, but Behring invented a process or method by which the toxic elements of the disease may be neutralized, so that thousands of human lives are annually saved—which brings us to the subject in hand.

While a revolution has taken place in medical practice, it must be borne in mind that disease is a large field, and it is not claiming too much to say that the upheaval has not affected the entire surface, nor touched all points of the circumference. Indeed, there are still vast areas of unexplored territory, but the discovery of magnesium infiltration opens up a new and promising lead which must bring joy to the heart of the pioneer in therapeutics—from both the scientific and clinical viewpoint. Eventually, discovery and invention must do for mankind what steam and electricity have done for commerce—popularize and democratize diagnosis and treatment, reducing these factors to their lowest terms and making every citizen an honorary member of the local Board of Health, as in the present widespread tuberculosis crusade, a popular, educational effort as well as a national propaganda. This does not imply that the public should undertake self-medication, but that the individual citizen should possess sufficient general intelligence to recognize deviations from normal

and appreciate the dangers of delay; it is the function of the doctor to determine the factors or elements which make up the morbid complexus and apply the remedy.

Definition.—Magnesium infiltration may be defined as an abnormal condition in which the cellular structures are surcharged with magnesium, with coincident depletion of the lime content.

To the non-technical reader, it should be explained that an "abnormal" condition is one brought about by disease, or in the case of deformity, something "interferes" with development or growth. The "cellular structures" include all the body tissues, the entire organism being made up of cells. Magnesium infiltration of the tissues occurs under certain abnormal conditions (chemic), an acid excess, which removes (depletes) the lime, when magnesium takes its place, and the tissues are said to be "surcharged" with magnesium. Both lime and magnesium are "proximate" or first principles, and they are also inorganic, derived from the mineral kingdom.

A plausible explanation may be offered to the effect that since both lime (calcium), and magnesium are proximate principles, the proportions might vary from time to time without any appreciable effect upon either function or structure, but that would be no evidence—mere assumption. Criticism might even go further, citing the long continued employment of magnesium sulphate (Epsom salt), as a popular domestic remedy and also a standard medication with physicians and surgeons for generations; but it must fall to the ground when confronted with the testimony furnished by physiologic research and clinical observation. Thus, magnesium sulphate solution injected into the spinal canal produces anesthesia below the point of injection, so that formidable operations are done while the patient is fully conscious, but without pain; similarly, the most forbidding cases of tetanus (lock-jaw), have been cured; locally, in the form of a saturated solution, it has been successfully employed in erysipelas; also, it is a most efficacious lotion in the case of bruises, swellings, and all varieties

of local inflammation, including ivy poisoning, all going to show that this hitherto harmless (?) remedy exercises a profound effect upon the nervous system, presently to be considered. The discovery of this pathologic complexus is an important step in demonstrating the function of cellular activities; working out a method or system for its correction is simplicity itself, substantially, a physiologic sequence or corollary, confirmed by chemistry and susceptible of microscopic demonstration—since it can be shown that magnesium infiltration is in fact a problem in nutrition.

Physiology and Pathology.—Certain facts are patent to the most superficial reader regarding physiology and pathology. The former deals with the normal functions of the living body—animal and vegetable—while the latter is concerned with diseased or abnormal conditions. Now, since the human body comprises a number of organs and various types of tissue composed of cells possessing peculiar and special functions, it is but natural, after learning as much as possible concerning normal function, that the medical investigator should turn his attention to derangements of the cell when the body is invaded by disease. Half a century ago, this work was well begun by Virchow, the celebrated German pathologist, but notwithstanding the notable advances in medical science, there has been developed no concerted effort to establish a “Cellular Therapeutics” as a complementary text-book to accompany and elaborate the science of disease as brought forward in his classical work, “Cellular Pathology.”

Function of Cells and Reactions.—A comparatively brief survey will show a peculiar and surprising harmony governing the cellular activities in health—especially when we consider the numerous and various relations and interdependencies existing in the human organism. For example, a disease may be chronic, insidious, and self-perpetuating until the occurrence of some unexpected event, to produce a shock in the nature of a favorable stimulus, when there follows immediately a marked improvement, more or less permanent. The counterpart of this proposition is likewise

possible, in fact, is frequently observed in real life—a person of previous good health experiences a shock, followed by a more or less rapid decline in health, which absolutely and persistently resists the most approved remedial measures.

The question arises here—Is there a physical cause, or a physiologic explanation to account for such an antithetic *denouement*? Replying in the affirmative, I should attempt an explanation upon the basis of our common knowledge relating to the function of cells as regulated and controlled by the “reactions,” as follows: As the first manifestation of disordered function, the “irritation” creates or produces a stimulus to the nervous system, this in turn giving rise to alkaline reaction—of the tissues involved. Under appropriate treatment, all symptoms may disappear. Treatment which neglects this indication will but aggravate the condition, because nothing is done to promote or maintain the harmonious molecular changes in the ultimate cells (protoplasmic cells).

Without treatment, if the disease advances, the stimulus, unable to correct the disorder, is abandoned, a vicious circle established and unless vicarious relief obtains, the disease process is uninterrupted. Again, a shock may give rise to nerve obsession to the extent that acidity—of the tissues—permits reversion in cell function and the formation within the body of various poisons—pneumo-toxin in the lungs, nephro-toxin in the kidneys, hepato-toxin in the liver, musculo-toxin in the muscles and neuro-toxin in the nerve structures.

These laboratory findings relating to cytotoxines (cell-poisons), effectually dispose of the claims of Dubois and others, who advocate dialectics for the psycho-neuroses on the theory that all nervous disorders are of mental origin. By the same token “Rest Cures” and “Exercise Cures” will cease to be fashionable when it can be shown experimentally and clinically that acid excess may be neutralized, molecular changes restored to normal and nerve conduction maintained—by the employment of medicinal measures based upon the unerring laws of physiology and chemistry,

coupled with our knowledge relating to the normal nervous stimuli, electric, thermic, mechanic and chemic, and to this should be added a fifth—dirigation, or psychic stimulus.

Thus, electricity enacts the role of a normal nervous stimulus which augments the alkalinity of the tissues, thereby restoring the cellular activities, with all the various functions grouped under the term "life," namely, nutrition, excretion, reproduction, motility and response to stimuli. Similar effects are produced by the judicious employment of heat (thermic), by mechanical means, such as massage, mechano-therapy and osteo-therapy, while medicinal measures include both mechanic and chemic stimulation, much being accomplished through the latter when abnormal reactions have led to factitious deposits, interfering with the vital functions above referred to. In the case of magnesium deposits, an area of tissue in the brain, heart, lungs, kidneys or liver, may be "insulated," followed by death of the cells, the obstruction refusing to be influenced by either electric, thermic, or mechanic stimulation. In such cases, chemic stimulation, by neutralizing excessive acidity, and favoring a restoration of the normal reactions, will cause absorption of the barrier, lift the embargo upon the transmission of nerve impulses and permit resumption of the cellular activities. Temporary benefit may be derived from dirigation, an increased supply of blood being directed to the part affected by various modern methods, such as Christian science, mental healing and the more recent Emmanuel movement, but the permanency of the "cures" must depend upon the ability of our patients to secure and maintain, at least approximately, the normal alkalinity of the blood, a hopeful, receptive, and contented mentality being of paramount importance.

Questions for Discussion.—The following pertinent questions come up here for discussion:

1. How are these symptoms and abnormal conditions developed?
2. How and where do they originate, and what is the exact nature of the causative factors?

3. Is this malady of such a character that it may appear as an intercurrent complication in the ordinary or usual diseases which prevail?

(1) Taking up these questions in their order, it should be stated that magnesium infiltration is essentially a disorder of the nervous system. Its development depends upon various conditions. Thus, it may appear as the actual disease, as in neuritis, neuralgia, angina pectoris, locomotor ataxia, arterio-sclerosis, or whenever the nerve supply is surcharged with magnesium—effecting insulation, by chemic transformation.¹

In the case of children suffering from intestinal disorders—"summer complaint"—it is an essential element of the disease as well as a factor in prolonging convalescence, by simple replacement. Similarly, in the indigestions, affecting the stomach or intestinal tract, it is a self-perpetuating factor, the origin being traceable to over-taxing the digestive capacity, followed by "acidity." With a restricted dietary, fresh air and proper exercise no medication is required. It precedes and follows rheumatism, and as a constant factor, is responsible for the thousand-and-one symptoms designated subacute and chronic. In diabetes, it is the same, leading to acidosis, indicanuria, uremia, the alkalinity of the blood being reduced thirty to fifty per cent. below normal, diminishing its oxygen-carrying capacity to that extent. United with calcium, it is the causative factor in hardening the arteries (arterio-sclerosis), and disturbing the circulation, thus favoring senile changes and the premature onset of old age. It is the alpha and omega of all

¹ Since the completion of this article there has been devised at the Johns Hopkins Hospital, Baltimore, an ingenious electric contrivance which will indicate approximately the relative degree of deviation from normal in all the disorders mentioned. A wire in the magnetic field is deflected according to the amount of current flowing through it, thus enabling the medical attendant to determine relatively the degree of insulation incident to the magnesium deposits. It is an achievement of vast significance, and coming at a time when this peculiar diathesis is beginning to attract attention, it will serve the modern physician an important purpose—its intrinsic value as a guide to treatment is comparable only to the mariner's compass.

neurotic symptoms, running down the line from simple "nervousness" to neurasthenia, to hysteria, to hypochondria, to melancholia, and including finally all the various types of insanity.

(2) To the student conversant with modern physiologic chemistry there is no mystery concerning the origin of the symptoms, or the exact nature of the causative factors—although some will reluctantly admit they knew it all the time, but had forgotten.

Briefly, the pathology is technically covered by the observation of Prof. Loew, formerly of the University of Munich, relating to magnesium sulphate, as follows:

"The calcium nucleo-proteids of the organized structures are transformed by the presence of soluble magnesium salts into magnesium compounds, while the calcium of the former enters into combination with the acid of the magnesium salt. By the transformation of organized nucleo-proteids into magnesium nucleo-proteids the capacity for imbibition will change, which must lead to a disturbance in the structure that will prove fatal. Only the simultaneous presence of dissolved lime salts can prevent this effect, according to the law of mass."

Apparently, the calcium is held in loose combination with organized tissue, or its depletion is more easily effected by acids than other inorganic proximate principles, so that the normal cellular activities are suspended, being hindered by magnesium in excess. Actually, lime being a stronger base than magnesia, unites with the acid, while the latter "replaces" the lime in the tissues—as above described.

Bearing in mind that this condition will change the capacity for imbibition (absorption), lead to a disturbance in the structure, and further, that it will interfere with the uninterrupted transmission of nerve impulses, the magnesium infiltration (deposits), acting as a resistance coil to the electric current—which supplies the energy for such transmission—the phenomena attending bowel troubles in children will be readily understood.

A brief explanation here will be sufficient to answer fully the question. So-called "summer diseases" of children arise from impairment in the nutrition of the nervous system, the normal stimulus to produce alkalescence—of the tissues—being diminished, retarded or absent, in consequence of lime depletion with consecutive formation of magnesium nucleo-proteids, the bowel movements being sour—acid.

To correct this defect and restore normal conditions, various methods are available, as follows: The exhibition of appropriate lime salts to recoup the depleted tissues and promote "dissociation" of the magnesium salts. The well known "chalk mixture" accomplishes this object, and when given in medicinal doses, there is also the local antacid effect to be considered. The addition of bismuth supplies a sedative and the two together furnish a physical barrier to the mephitic action of microorganisms, a subject which has been followed up with a far greater display of learning than judgment. Our homeopathic brethren treat these cases successfully, even after failure of the approved antiseptic methods, by the employment of *calcareo carb.* (calcium carbonate), and that, too, without seeing the child, a complete cure being effected within twenty-four or forty-eight hours.

When it is deemed advisable to employ a "stimulus" as a means of promoting or restoring alkalescence, we have copper arsenite, a single small (comparatively) dose being usually quite sufficient—in the early stage, before lime depletion has exhausted the "irritability" of the nerve structures—and the same is true of electricity and massage and osteopathy, although our predecessors, in such cases, depended largely upon sedatives, usually opium or its derivatives, and had a strong leaning toward blisters and other forms of counter-irritation, turpentine, both internally and externally, being in great favor, using sedatives in combination with stimulants, thus showing lack of knowledge or lack of judgment.

Christian science, psycho-therapy and the more recent

"Emmanuel" movement, all depend for success upon the results of dirigation, a mental (psychologic) process, by which alkalescence is secured through "nerve stimulus," brought about, or initiated, by introspection. Substantially, the same effects may be secured by purely physical measures, as in Bier's method of producing artificial hyperemia, whatever improvement occurs being susceptible of demonstration by means of instruments of precision. For example, in the case of obstruction to the circulation in one of the extremities—arm or leg—a tape is applied with a moderate degree of firmness above the involved area, to prevent the return flow of blood, and its repetition from time to time is attended with marked amelioration of the symptoms. Indeed, it has been suggested that the tape may be applied to the patient's neck in the case of disorders of the circulation involving the brain structures.

Of course, in this class of cases, the physical remedy is reinforced or emphasized by the psychologic factor; but neither, nor both together, are the actual remedies—they are simply the means of securing a determination of blood to the part. It is the blood itself which affords relief—not because it contains certain nutritive elements, such as oxygen, hemoglobin, various salts, etc., but for the reason that it augments the alkalescence of the tissues—and *makes the cells work*.

(3) In replying to our third query, special attention should be directed to certain logical deductions, axiomatic deductions, if we are to place dependence upon the evidence furnished by physiologic and chemic research, as follows: Nerve stimulus is demanded to create and maintain a normal alkalescence of the living tissues. The converse is also true—that impairment of nutrition hinders or obtunds cellular activity—leading to an excess of acid. Acid excess gives rise to various retrograde changes—reversion in cell function together with the formation of cytotoxines (cell-poisons)—and may ultimately constitute the exciting factor in different diseases. Magnesium infiltration being the direct and immediate effect of acid excess, it follows that

it must be a concomitant of all disease processes, and from a clinical standpoint this is true—in general and in detail. Consider the evidence—acid stools in summer diseases of children, sour eructations (water-brash), in certain forms of dyspepsia, profuse sweating (always acid), in all acute diseases, notably in rheumatism and scarlet fever, night-sweats in chronic ailments, gout, influenza, tuberculosis, and frequently, during convalescence from acute diseases—in which the skin takes on a vicarious function.

What folly, then, to administer drugs or apply remedies when acid excess has demoralized the harmonious relations of the cellular functions—the magnesium infiltration having arrested imbibition (absorption), inhibited or hindered the transmission of nerve impulses and laid an embargo upon electric energy? And, instead of consigning a patient to solitude in bed, to rest—and rust—or compelling him to exercise—and suffer—would it not be the part of wisdom to follow the lead furnished by nature by supplying an antidote to magnesia, or, to flush the system with an alkali by way of restoring the physiologic equilibrium?

With a comprehensive plan of this character generally accepted by the profession, the *hegira* of our patients to take up with psychologic hobbies would cease, and we should hear less unfavorable comments upon the short-comings of medical practice.

Invasion and Recovery.—The invasion of disease is always attended with modifications in cell function as here outlined, and this again, for the most part, arises from the insidious development of acid excess as a resultant of defective assimilation, primary and secondary, and reversion in cell function—retrograde tissue change. Whether the disease be acute or chronic, whether it affects the infant, the adult or the aged, there is always a pre-diseased condition which may be recognized by the physician who becomes thoroughly familiar with the symptoms and laws relating to its progress. As a matter of fact, in most instances, an oncoming affection may be anticipated, so that if it cannot be prevented, its gravity may be greatly mitigated. In the

case of children, I have shown how impairment in nutrition leads to acid excess with magnesium infiltration, pointing out at the same time the methods which modern science indicates may be employed for their correction.

Incidentally, it may be remarked that an efficacious treatment might be outlined for practically all diseases, assuming, of course, that this line of medication is constructive, and as such follows and dovetails with the employment of the antitoxins, the latest as well as the greatest achievement of medical science. Indeed, the antitoxin treatment often fails, because the acid excess of the tissues is overlooked or neglected as a factor which increases the severity of all diseases, acute and chronic. This is especially marked in cerebro-spinal meningitis, where the increasing acid reaction of the spinal fluid indicates the progress of the disease to a fatal issue. The same is also true of diphtheria, and even where recovery ensues, the patients experience prolonged convalescence, owing to kidney and heart complications along with rheumatic symptoms—arising, of course, from the continued acid excess with consecutive magnesium infiltration. The so-called “typhoid spine” is another striking illustration, a wasting of one or more of the spinal vetebrae—in consequence of acid excess—a condition which is preventable and also curable.

To promote recovery, there are two distinct indications—aside from maintaining the digestive capacity—as follows: To neutralize acid excess, determined by testing the saliva with blue litmus paper, or the skin, after moistening the paper, no laboratory tests being required, or necessary. The second indication is to supply the system with the needed lime salt which is demanded to restore the integrity of the cellular activities, reinforce wasting bone structures, or by means of dissociation, eliminate from the tissues any surplus magnesium salts—in accordance with the formula of Loew.

Summary.—Magnesium infiltration, whether of the acute or chronic type, is an insidious ailment, because unseen, unrecognized, and persistently denied. It affects the

infant in arms as well as the octogenarian, the factory operative and the millionaire, the school boy and girl in their teens, the retired merchant and the woman at the climacteric, rich and poor alike—none escape its obsession, or fury. Appearing as an uninvited guest, although not without premonition, it strikes down its victim at the banquet table—lawyer, banker, and high church dignitary. It follows the manufacturer to his office, the mechanic to his daily task, the conductor to his train—then comes the “short-circuit” to complete the wreck.

As showing its wide-spread and far-reaching influence, its untiring perseverance and relentlessness, it secures entrance to every sick room, to every hospital, to every sanitarium and gloats with apparent satisfaction and fiendish delight as its rapidly increasing army of recruits peer through the barred windows of our over-crowded asylums.

Believing in a great law of compensation, I am inclined to be optimistic, even sympathetic, taking a less gloomy view of the outlook, because the evidence is overwhelmingly convincing as to the pathology, the causative factors are clear and distinct, while the success of the remedial measures has been repeatedly demonstrated.

Most important of all, however, is the question of prevention. Will the evidence presented be sufficient to effect the necessary dietary reformation—at least for the rising generation? Shall history repeat itself, in the downfall of our country as a sequence of dereliction on the part of the medical profession, permitting the development of a pygmy race—nervous exotics—gelatinous, albuminous, but spineless? Time, the universal arbiter, must decide whether the effort is in line with modern sociology, or its advocate a rare and misguided altruist.

GENERAL CONSIDERATIONS—CONTINUED.

Susceptibility and Resistance (Immunity)—Nature of Infection—Age—Occupation—Diet—Environment—Heredity, Atavism, etc.—Galton's Law—"Mixed" Transmission—Mendel's Law—A Diathesis, Acquired and Chronic, or Constitutional—Conclusion.

In the previous remarks an effort is made to indicate the broad lines upon which medical practice is now conducted, considered as an art and as a science; how it is related to, and dependent upon, both discovery and invention—with the object of developing a practical elucidation of the implied question, "Is magnesium infiltration a new disease?" Brief reference is also made to the physiologic basis, as shown by observation and research in health and disease; in short, the pathology, studying the function of cells and how they work under normal conditions—in respect to reactions, bringing forward at the same time a resumé of the symptoms and causative factors in the production of disease, showing how and why they follow or attend certain deviations from health, and why magnesium infiltration is practically universal in all types, both acute and chronic. The significance and importance of the discovery is more fully elaborated in considering the various factors involved when disease invades the system, together with their bearing upon the vital activities, or vegetative function, during convalescence. In conclusion, a note of alarm is sounded, inasmuch as the continued failure to observe patent facts, or neglect to interpret them, foreshadows serious complications in treatment, if they do not actually lessen resistance to infection, and thus, gradually, but certainly, promote or foster chronic invalidism.

Susceptibility and Resistance.—Immunity is a relative term used to express the degree of susceptibility or resistance possessed by a living organism, animal or vegetable, against disease, the latter to include everything from the slightest

disorder of function without appreciable lesion, to typhoid fever and diphtheria, both due to special bacterial invasion, as well as scarlet fever and smallpox, in which the precise nature of the infection is unknown. Immunity is secured by various means, such as an attack of disease, hereditary influence, the employment of antitoxins, or the introduction into the body of living or dead bacteria or their products.

Normal resistance is an important factor—in health. It includes the so-called “protective agencies” which guard against the invasion as well as the harmful effects of bacteria after securing entrance to the body. Thus, certain leucocytes (white blood corpuscles), called phagocytes, ingest (digest), and destroy bacteria—called “phagocytosis;” antitoxins are normally produced through the activities of other leucocytes, this phenomenon being known as “leucocytosis.” Both phagocytosis and leucocytosis represent the reaction, or the defensive ability of the system, but we also have bacteriolysins—substances which are formed within the body fluids by the union of two separate bodies—possessing the capacity for dissolving bacteria. Besides, we have real or genuine antiseptic substances in the blood serum and in the tissues, which hinder or restrain bacterial growth, first demonstrated more than a century and a half ago and referred to as John Hunter’s “living principle.” Finally, should be mentioned the protecting layers of epithelium, the cellular covering, both outside and inside the body.

In general terms, the following proposition is warranted, whether viewed from the scientific or clinical viewpoint: Resistance to infection is the normal status of the human organism, while susceptibility to disease indicates a subnormal condition, one in which the cellular activities are suspended, hindered, or radically changed. It will fall within the province of this sketch to present concrete examples of the insidious influence of magnesium infiltration, not only in lessening resistance, but also the positive effects which follow in its train, through increased susceptibility.

Nature of Infection.—As a preliminary to this discussion, it will be the part of wisdom to state briefly the nature of infection, making a distinction between bacterial invasion and simple, or inflammatory reaction, since not all disorders arise from bacterial infection. For example, until quite recently, the vital statistics of Philadelphia showed a weekly average of one hundred cases of typhoid fever, or over five thousand cases annually, with an average mortality of ten per cent. That all the inhabitants were not affected was due to the normal resistance, constant exposure from drinking the polluted water having established a “tolerance.” In other words, so long as a normal health standard is maintained, the various protective agencies of the body are sufficient to prevent infection—long continued, a degree of immunity might be produced, similar to that which follows an attack of the disease. Still, typhoid subjects are not free from danger, since it has been found that they may become active disseminators or carriers of the disease, the infection being found in vast numbers in the stools and urine—even for many years after the attack. A “contact” disease, the infection must invade certain glands (Peyer’s patches), situated in the small intestine, where they multiply with great rapidity, causing the “fever.”

In the case of diphtheria, the infection finds lodgment in the mucous membrane of the throat, although it may invade the system through an abraded surface—the skin as well as the mucous tissues. In tuberculosis, the germ may find a suitable nidus for its development at almost any point, even bone-structure not being exempt, thus differing materially from both typhoid fever and diphtheria, although all bacteria are fungus growths (vegetable), and belong to the same order—schizomycetes. Thus, the warfare against infection is between a low grade of vegetable microorganisms and highly specialized animal tissue composed of organized cells, possessing all the properties and functions of life—nutrition, excretion, motility, reproduction and response to stimuli. Infection, therefore, differs from simple inflammatory reaction, due to defective oxidation and failure in

elimination, which not only lessen resistance and augment susceptibility, but the attending phenomena give rise to reversion in cell function—through the irritation set up—leading to every possible variety of disorder, functional and organic. Moreover, the two overlap, resulting in extremely complex and obscure complications. Following up this line of inquiry would involve a study of symbiosis, psychology and synesthesia, at present, almost a trackless waste, although it gives promise of rich rewards to future explorers.

Bearing in mind that bacterial infection is specific (pathogenetic), that “disease” as a result of inflammatory reaction, is substantially, a decomposition, we are prompted—stimulated—in our efforts to discover, if possible, the cause of the cause of all deviations from normal, to be found in the writer’s opinion, as a result of defective assimilation, and modified both directly and indirectly by age, occupation, diet and environment.

Age.—The trite observation that age is a factor in securing or producing immunity, is particularly appropriate in connection with the study of magnesium infiltration. Indeed, it is here that we observe the most practical demonstrations, and besides, with the illustrations and evidences brought about through medical treatment, the possibility of mere coincidence is barred. Thus, during infancy and early childhood, when tissue change is active, not only is the mortality exceptionally high, but convalescence is prolonged, and not infrequently, the child is crippled for life through failure in the treatment—discharges from the ear and heart complications after scarlet fever, suppurating glands and paralyses after diphtheria, hydrocephalus (water on the brain), or deformity from failure in nutrition, after cholera infantum—nearly all of them preventable, because most of them are susceptible of cure by the judicious employment of the lime salts in conjunction with medication demanded for the correction of abnormal reactions. In adult life we have typhoid fever, rheumatism, pneumonia and their sequelæ, together with kidney and liver disorders and heart diseases, but more special mention should be

made of nervous disorders, all traceable to deviations from normal, disturbances in the reactions being responsible for their persistence—as well as for their appearance—because correction of abnormal reactions with the consecutive elimination of factitious inorganic proximate principles affords immediate amelioration of the most forbidding symptoms, even when a cure is beyond the domain of medical skill. Nowhere is this claim more specifically demonstrated than in the treatment of arterio-sclerosis, or hardening of the arteries, when the subject is advanced in years, or as frequently happens (occurs), when the patient is prematurely aged, as a result of defective secondary assimilation. The coincident neurasthenic manifestations alone are actively treated, while efforts to antidote or secure elimination of inorganic irritants are of the most perfunctory character, potassium iodide being the only recognized “alterative.”

Age is thus shown to stand as a preëminent factor both in diminishing resistance and increasing susceptibility to disease, although it will be apparent even to the most casual reader, that the subject of magnesium infiltration is really, a problem in nutrition.

Occupation.—As an exciting factor in developing a susceptibility to disease, of course, occupation cannot be overlooked, but with our knowledge relating to the phenomena governing reactions, together with the known adaptability of man as regards diet, climate and environment, this is of secondary importance. For example, within comparatively recent years it was considered unsafe to make a lengthy sea voyage, owing to the danger of scurvy and typhus fever, although we now know that the former is in fact an inflammatory reaction arising from unsuitable food—reversion in cell function following disturbances in the reactions—while the latter is due to a specific bacterial infection, which can be eradicated by improved sanitation—so that the occupation of a sailor is not hazardous, except as regards accidents. There are, however, certain features connected with various occupations which lessen resistance and

augment susceptibility, either through lack of proper ventilation, such as silk mills, cotton factories and department stores, or because of the dust and fumes in the atmosphere, cutlery shops, marble works, chemic laboratories and notably match factories. Still, there is practically no occupation without its drawbacks, even lawyers, ministers, teachers and bankers being constantly exposed to infection through atmospheric influences. To counteract occupational disorders, we must learn the primary defects or tendency of the organism, and endeavor as far as possible to restore the physiologic equilibrium, the maintenance of which will contribute materially toward the promotion of nutrition. Thus, in the case of workers exposed to inclement weather and sudden changes of temperature, we have complaints of subacute and chronic rheumatism, lumbago, sciatica, neuralgia and neuritis, due to the acid excess developed as a result of interference with the cellular activities and the consecutive magnesium infiltration. Again, lawyers, bankers, teachers and all others engaged in sedentary occupations are frequently, if not usually, more or less debilitated, at least they are not robust, in consequence of defective oxidation, through lack of sufficient out-door exercise, thus increasing susceptibility to inflammatory reaction incident to general impairment of the nutrition. Eventually, there is more or less "nervousness" set up, with insomnia and inability to coördinate ideas, and a general feeling of malaise supervenes—for which tonics and rest and vacations are recommended—in vain, because, while nature is constructive and eminently conservative, she draws the line at consummate folly.

The rapidly increasing number of sanatoria and rest cures throughout the country must be regarded as evidences of the inefficiency of medical treatment, showing beyond peradventure that the profession has neglected or failed to employ the resources at hand. Our pressing need at the present time is a digest or medical concordance with a modern search-light, so that "he who runs may read."

In these days, the spirit of rivalry is confined almost exclusively to bacteriologic investigation.

Diet.—The subject of dietetics has, indeed, passed through many vicissitudes, and should we take heed of the faddists, the entire culinary superstructure would be demolished and rebuilt on different lines—although modern teaching is so variable and kaleidoscopic that we are confronted with a veritable babel. That diet is an important factor in maintaining health and promoting longevity is unquestioned; that it modifies nutrition, by augmenting or diminishing susceptibility to infection, has long been recognized; and that it requires a knowledge of physiologic chemistry as well as definite information relating to pathology is a patent fact; but the vagaries of pseudo-authorities are amusing rather than ridiculous, while *ex cathedra* enunciations are, many of them, ludicrous in the extreme, by reason of impracticability. As a consequence, the masses are guided by the glowing prospectuses which elaborate utterly impossible benefits arising from the daily employment of highly superior (?) laboratory products, the best that can be said of them by disinterested critics being that they represent the refinement of cruelty in modern civilization, all of which should be taken, *cum grano salis*.

While biblical teachings are mainly figurative, we frequently find intelligent but misguided people showing a persistent tendency to demand literal translation—to support a hobby or illustrate a theory. “Give milk unto children and wine unto him who is ready to perish,” is no more an endorsement of alcoholic stimulants than the belief that wearing rubber boots is a divine command, because a logical deduction, from the description of Canaan, “A land flowing with milk and honey.”

As showing how diet affects health, let us take simple, easily understood illustrations. Here is a child convalescent from some more or less severe bowel trouble; it is given a banana to eat and in the course of twelve to twenty-four hours there is pain, restlessness, and perhaps fever—because the impaired digestion with acid excess interferes with the

normal assimilation, leaving the lime and magnesium to combine with the friendly organic banana, forming a sand deposit. A similar result follows the ingestion of certain fruits, strawberries and raspberries, after typhoid and other wasting diseases, notably tuberculosis and uric acid diathesis, in consequence of the disassimilation and the tendency of the seeds to "gather" the surplus inorganic substances—furnishing an elementary lesson in magnesium infiltration. Again, these various conditions might set up active inflammation, requiring operative interference, owing to symptoms of appendicitis, a malady which still retains its popularity.

But even without the bananas and the fruit seeds and the uric acid, we may have involvement of the delicate nerve mechanism as a result of intestinal acidity, or fermentation, leading to inflammatory reaction—and operation. In such cases the liver is debilitated and inactive, its nerve mechanism being similarly affected; there is intestinal decomposition as well as fermentation, and patients complain of a metallic, sometimes a putrid taste in the mouth—due to reabsorption of bile, thus furnishing a rather complex illustration of magnesium infiltration. Other conditions of like character will serve to emphasize its various possibilities—arising from excessive acidity—such as neuralgia and neuritis, the former occurring spasmodically, the latter practically constant, both due to an electro-plating process, which interferes with the transmission of nerve impulses.

As previously pointed out, the inorganic deposits enact the role of a resistance coil, inhibiting the electric current, the motor for nerve transmission. This is well illustrated in the case of recovery from ptomain poisoning, the pronounced heart weakness being due to reversion in cell function with rapid accumulation of acid—an acidemia—in which the blood is surcharged with acid, promptly alleviated by the administration of suitable alkalis.

In this connection should be mentioned the immediate and marked effect of "red" meats, containing so-called "purin" bodies, conspicuous as a factor in aggravating

lithemia and gout, and likewise, the unrelenting enemy of sedentary workers after fifty years of age.

So far, diet has been considered from the viewpoint of the indigestions, with operations and chemic antidotes on the side, as alternatives, but there is another perspective which should be brought into view, since, after all, diet is more a matter of form than of substance. However, our inquiry relates only to the diet question in its relation to magnesium infiltration. That popular notions are fallacious is well illustrated in the case of children, where sickness is the rule rather than the exception, owing to unsuitable diet, and yet parents think cereals and other "sloppy" foods are the *ne plus ultra*, all animal foods being interdicted. Others, again, insist that the secret of health and long life lies in thorough mastication, but how shall we reconcile these teachings, which lead to a *reductio ad absurdum*? In adult life, the folly is constantly apparent—in diminished resistance, augmented susceptibility and general lack of vitality—because of the ever-present intestinal indigestion—while in advanced age the symptoms are emphasized. The characteristic symptoms in such cases are more fully outlined later on in this section.

Environment.—The American term "surroundings" is better understood in this country than the French equivalent. Its influence upon immunity is so great, indeed, that for generations, practically all its untoward effects were grouped in connection with heredity, and it is but recently that we recognize a wide gulf separating the two. And here, the question is pertinent—How can we demonstrate where environment ends and heredity begins? For example, observation shows that normal and healthy individuals, children as well as adults, when exposed to a life such as led by slum-dwellers, quickly succumb to the insanitary surroundings, since they are more readily susceptible to the local influences. A similar change, called acclimatization, occurs when a person changes his habitation, but all agree that improved sanitation is the prime factor, all others being more or less superserviceable. Tuberculosis,

long regarded as hereditary, is now recognized as "contactuous," the infection being brought into contact with a suitable soil for its growth and multiplication—and usually the victim is in a debilitated condition, as otherwise this vegetable fungus would fail to reproduce itself. In other words, the environment has diminished resistance and increased susceptibility to the point where a "decline" has set in, a wasting or consumption of the tissues confronts us, and thus we have the ground plan, really, the "blue print" of tuberculosis—an infection engrafted upon a wasting disease, one which could not have occurred except through the medium of "surroundings" or environment.

Sanitation is brought prominently to the fore—as the keystone of the arch—but it is not the structure itself, as taught by recent misguided enthusiasts, who should know better. It will not cure tuberculosis or diphtheria, nor typhoid or scarlet fever, because the causative factors are overlooked—the debility and wasting which lessen resistance and increase susceptibility—insidious factors which arise from defective assimilation incident to the disturbances in structure and function of the cells, with the consecutive magnesium infiltration. Thus, at least in the case of tuberculosis, we see, as through a "glass darkly," that the cause of the cause of infection is overlooked, neglected, submerged as it were, through the high rating given to environment—with a superabundance of milk and eggs on the side.

Substantially, the same conditions obtain in general debility, neurasthenia, premature senility and insanity, apparently all due to environment, although on the contrary, their development may be traced directly to the disturbances in the cellular activities attending the so-called indigestions.

Unfortunately, such patients are usually "hypped" and refuse treatment unless the diagnosis conforms with their own conception of pathology. When recovery follows medication, it is not the exception to have the patient make a discriminating admission that while diagnosis was defective, the treatment was successful, a further proof of the claim

advanced that we have to deal with a derangement of function ante-dating the well known frank manifestations of disease. A person's surroundings, in most instances, exercise an important influence upon convalescence as well as invasion, a pointer for our friends, the psychologists, but with correction of abnormal reactions and dissociation of magnesium deposits by chemic agencies, there is no demand for prolonged observation, with change of climate and rest, continued and repeated. Environment, therefore, is principally an incidental rather than an exciting factor as regards immunity, secondary to diet, occupation and age, but closely related to psychology, the connection being more apparent than real, however, when studied from the standpoint of physiologic chemistry. It is the "brake" on civilization, the material force which hinders or impedes progress in nations as well as in communities, because it interposes barriers and checks individual development.

Heredity, Atavism, etc.—In general, heredity and atavism are names or terms applied to certain characteristics in the form of physical or mental deviations from normal which descend from parents to children, the former when the transmission is direct, as from father or mother to son or daughter, the latter when the peculiarity "skips" one or more generations. Heredity is usually obvious and apparent, while atavism, being termed a "survival," is frequently difficult to trace. Thus, "ethnographers attribute to atavism numerous moral delinquencies such as lawyers charge to a criminal disposition," the Jukes family genealogy being cited as an emphatic illustration. The heritage of spangles and tights is said to be guarded with "the jealous care of a royal genealogy," so that the leading circus performers can be included in thirty families, tracing their lineage in some instances more than two centuries. Apparently, the thrill of the sawdust ring has got into the blood.

Unless heredity is a pronounced factor, however, much can be done to correct or overcome a predisposition, while the characteristics dependent upon atavism are both inherent and personal and almost ineradicable; but much

may be accomplished in both cases through judicious oversight and training during infancy and adolescence, provided always that proper care is observed in promoting harmonious physical growth and mental development under normal conditions as indicated by studying the reactions. As a matter of fact, it is a safe prophecy that in the near future, this question will take on increasing significance in all discussions upon psychology, because magnesium infiltration is so intimately related to nerve conduction that its importance can not much longer be overlooked. How far, or to what extent, this abnormal condition is responsible for the transmission of peculiar traits is beyond the scope of this work to discuss, but the rapidly increasing number of "nervous" children whose parents are "shining examples" of the disorder lends color to the supposition that in this direction lies the indication for exploration intended to discover the "missing link" between health and disease—the line of demarcation between the normal and the abnormal.

Many cases of degeneracy are directly traceable to magnesium infiltration, the following being a case in point, that of a young man who "slew to feed a mad vanity."

"In his confession he revealed a career of almost life-long crime. Following a blow on his head while he was a small boy in his native town, he said he began to steal. At the age of nine he rifled the pockets of his school-mates and robbed his parents of small sums. Later, while still a youth, he held up young women on the highway and entered houses. He spent some time on a naval training ship and then travelled about the country, his thefts covering a wide range of territory. By engaging in legitimate occupations by day, he always escaped detection. . . .

"'I can't tell why I do these things,' he said in a tone of semi-desperation. 'Why, I used to get up in the night, dress, and leave the house unknown to anyone, carry out some quickly conceived plan and return to bed.'

"He has never failed to greet his mother with a kiss, and the affection between him and his sister was apparent."

Galton's Law.—Galton's law is briefly stated by E. T. Brewster, as follows:

“That of the total inheritance of any living being, plant, animal or man, each parent has contributed a quarter, each of the four grandparents a sixteenth, each of the eight great grandparents a sixty-fourth and so on; while the influence of each generation is just equal to that of all the generations that have preceded it.”

In the case of cancer we shall have in the near future a remarkable illustration of certain peculiar features or facts, relating to hereditary transmission. For example, while cancer “runs” in families, there is evidence accumulating to warrant a belief in its cellular transmission, since these abnormal growths follow their predecessors by developing within the same tissues. Thus, epithelioma, or cancer of the skin, does not follow cancer of the stomach, liver, or any other internal organ, and *vice versa*. But cancerous growths affecting the skin do not appear early in life, and moreover, they are accompanied by various systemic physical changes and chemic abnormalities which are amenable to treatment, when the malignant character of the growth subsides. Indeed, the outlook indicates that under normal reactions cancerous growths will not develop at all. Laboratory findings show that cancer is not contagious, that it is transmitted only by contact under certain restrictions, and that in a large percentage of cases artificially produced in mice by inoculation, spontaneous recovery ensues, while at least forty per cent. of the animals inoculated prove resistant. Why such a large percentage are not susceptible, and why one-third of those attacked escape its malignancy, making perfect recovery, are questions still unsettled, but inasmuch as these laboratory experiments have failed to consider the physical and chemic status of the reactions in cancer, it is not too much to assume that here may be found an illuminating factor of more than ordinary significance.

"Mixed" transmission is frequently observed in heredity and atavism, especially noticeable in the case of alcoholism, so much so as to lead investigators to claim that alcoholism itself is a disease, but with our knowledge relating to the physiologic effects of alcohol upon living tissue, coupled with the insidious action of magnesium deposits in obtunding nervous sensibility, the obscurity and mystery which have so long enveloped this question are likely to be cleared up. By way of illustration, the nervous system may be compared to a spider's web. When the fibers are broken or become disarranged, the movements of the spider are hindered or obstructed, but not seriously embarrassed, since he can go around the obstacle. So, in alcoholism, certain organs or tissues are liable to become insulated through a hardening process which affects the nerve supply—as a resultant of alcohol with consecutive magnesium infiltration—compensation being secured by a more or less complete collateral innervation. However, a collateral nerve supply under such conditions is necessarily imperfect, from the fact that we have to deal with a local manifestation of constitutional derangement. Brain disorders, functional diseases of the heart, kidney and liver diseases together with all spinal affections come within this category.

In this connection, it seems the part of wisdom to suggest the probable relation of magnesium infiltration to insanity as well as to mental defectives and degenerates, the warrant for this recommendation being based upon the brilliant clinical results attending the treatment of ordinary "nervousness" and well marked cases of neurasthenia.

And here should be mentioned the interesting investigations of Merzbacher, who has traced family records through successive generations—varying from three to seven—indicating that certain familial diseases of the central nervous system are undoubtedly transmitted. Apparently, there is a "mixed" transmission, since the same malady does not appear in related families, and moreover, while progressive in character, a disease peculiar to a family would disappear completely for a generation, reappearing

in the next. An important deduction arising from this inquiry relates to the predominating influence of the mother in transmitting a tendency towards disease or health, and the following conclusions are advanced

1. The rudiments of a defect or a disease may descend by heredity, but remain latent in the system without giving any evidence of its presence through several generations.

2. When such latent tendencies are present in the father, they are not inherited by the children, . . . although a latent tendency might be inherited by his daughter and appear actively developed in her children, but the children of the man's son would not inherit it.

3. The mother's influence is stronger (than the father's), and she may transmit a defect or disease that is latent or active in her own system; or if she has no such tendency, she may overcome any influence of that sort on the father's side.

4. When a disease of this character becomes established in a family, it shows great stability in its development.

Whether my presentation of this subject be accepted or rejected, no one today is in a position to successfully contradict the logical deductions, either from a theoretical standpoint, or from clinical observation, and besides, there is cumulative evidence at every turn, notably with reference to our teachings upon diathesis.

Mendel's Law.—Mendel's law aims to develop heredity upon a scientific basis—by showing that vigor and virtue are *dominant* factors, while vice and weakness are *recessive*. In other words, dominant factors or traits are persistent while defective traits show a tendency to recede or disappear, this theory being confirmed (?) by statistics—the mating of defectives is always characterized by a downward course in the offspring. Undoubtedly, a consideration of the chemic factor would lead to more definite and greater reliability in these calculations.

A Diathesis.—The term diathesis is employed in medicine to indicate a personal susceptibility to disease, such as gout, calculus, uric acid and diabetes, and may be acquired

or constitutional (hereditary). Certain persons known as "bleeders," suffer from hemorrhagic diathesis, and consequently are not suitable subjects for surgical operations. The personal disposition in certain families to apoplexy has even been claimed to indicate a diathesis or hereditary tendency, but in view of the fact that we have its exact counterpart without evidences of transmission is a serious obstacle in these days of scientific inquiry. There is a maxim to the effect that a disease which is curable is likewise preventable, and it requires no stretch of the imagination to believe the diathetic disorders preventable, because all those just mentioned are curable—by neutralizing the acid excess which gives rise to their appearance, thus restoring to normal the cellular activities.

It appears almost incredible that so much study has been given to dietetics without further advancing in the line of practical adaptation of means to ends. In other words, the excitement incident to determine the demands of the system as regards the amounts and relative proportions of proteids, fats, and carbohydrates has obscured the vision in respect to the pivotal factor, assimilation, and as a result, the treatment of disease, and especially diathetic disease, partakes more of mechanic ability than it serves to demonstrate physiologic skill. And, in addition to this, the diathetic diseases require at least a passing acquaintance with physiologic chemistry, to the end that progressive changes may be arrested, as in gout, lithemia, neurasthenia, diabetes, etc.

While it is true that numerous disorders of adult life and advanced age are foreshadowed by the character of the ailments which prevail in childhood and adolescence, it is nevertheless true that these tendencies do not properly belong to either period—or they would be universally prevalent. Hence, as previously stated, the folly of dietetic vagaries is apparent in adult life, while in advanced age, the symptoms are emphasized.

Within the past twenty years statistics show that certain diseases, diathetic in character, have gradually increased,

notably cancer, neurasthenia and insanity, and it is not beyond the range of possibility, in fact it is quite probable, that the prevalence of influenza, with its characteristic physical and mental depression, may be responsible. Granting the supposition, which is now a well founded belief, would but strengthen the claims so far advanced, since the characteristic physical and mental depression which follow in the wake of influenza are due to magnesium infiltration—and disappear when the abnormal chemic combinations are displaced (dissolved), by the administration of lime salts in excess, to promote dissociation.

The human organism is a microcosm, a little world in itself, and possesses in miniature and in gross all the attributes and properties of the protoplasmic cells of which it is composed—nutrition, excretion, reproduction, motility, and response to stimuli. Considered either as a physiologic aggregation or a complex mechanic contrivance, its continuous operation is necessarily attended with accidents which create friction and give rise to defects, and like all things terrestrial, it has its limitations. It differs from the "One Hoss Shay," in that it gives out one part at a time. The truth is, that there is a constant tendency towards crystallization, due to osmotic pressure and to the presence of inorganic proximate principles, the mineral substances. In this there is a striking similarity to the mineral kingdom, in which we find diamonds, rubies, and other precious stones, and in the treatment of disease this ultimate transformation cannot be overlooked or disregarded.

A word in regard to osmotic pressure, a constant and potent factor in physiology, and an essential element in producing artificial segmentation in certain low forms of animal life—without fertilization. We may obtain a slight idea of its character by holding a sea-shell to the ear, although the demonstration affords but little information concerning its significance or importance to the animal economy.

Conclusion.—Finally, it should be stated that it is the function of the clinician to interpret and to formulate methods of treatment. Plotting the early deviations from

normal as well as the later symptoms of magnesium infiltration in various diseases, with observations extending over many years, the possibility of error or mere coincidence is excluded—these claims being confirmed by the records of experimental research, physiologic and chemic. In short, the subject of magnesium infiltration is no longer an academic question, but a concrete, demonstrable factor in practically all types of disease, acute and chronic, functional and organic.

In recent years, the general practitioner has lost caste, owing to the achievements of the surgeon, and his inability to cope successfully with the various obscure nervous conditions—concomitant factors of our modern civilization, these cases gradually drifting into the hands of outsiders who decry drugs, claiming that such patients require no “material assistance.” This unfortunate state of affairs has developed coincidentally with the vacillating nature of the numerous unfounded claims set up, coupled with the arbitrary condemnation—without hearing—of any and all investigators whose teachings are not in accord with tradition. Paraphrasing the criticisms of the religious press on President Eliot’s scheme for an universal religion, with “banishment of the supernatural,” it is not too much to say that medical practice at present is obscured by the “fog of uncertainty, the mist of unreliability, and the clouds of instability.” And yet there is nothing supernatural in medical science, notwithstanding the notable achievements of the psychologist, and moreover, there is neither excuse nor reason for the apparent mystery relating to health maintenance. Our teachings are biased and dwarfed through the observance of, and reliance upon, tradition. A multiplicity of schemes have been launched from time to time by ambitious enthusiasts, to the discredit of medical science; even the profession as a body has frequently pursued an *ignus fatuus*, endangering the life and health of the public, but the time has arrived when our recommendations must have the support of reason, confirmed by scientific demonstration, such as here outlined, excluding the narrow, bigoted, *ex cathedra* pronouncements of so-called leaders.

DISORDERS OF NUTRITION.

PHYSIOLOGIC DATA: RESUMÉ.

The Milk in the Cocoon—A Malady Easily Recognized—Physiology and Pathology—The Blood and Protoplasm—Organic and Functional Disorders—Red and White Corpuscles—Blood Plasma—Hemoglobin and Derivatives—Aëration and Ventilation—An Apotheosis of Medicalism—Respiratory Function of the Tissues—Diminished Alkalescence—Edison's Work on Colloids—Transient Effects of Electricity—Electro-plating from Magnesium Oxide—The Problem in Nutrition—Mass Action.

To advance the claim that all disorders of the circulation, such as arterio-sclerosis, Raynaud's disease, aneurysm, angina pectoris and paralysis, are due either directly or indirectly to magnesium infiltration, would seem incredible in the extreme. The addition of nervous diseases to the category—vomiting of pregnancy, neuritis, neuralgia, neurasthenia, hysteria, and even insanity—will be regarded as radical claims. But pathology has not yet demonstrated any definite and substantial basis for these latter deviations from normal which brings them within the domain of the clinician and amenable to therapeutic art. While a post-mortem shows how and why strychnine and digitalis and aconite cause sudden death, in the case of heart failure—so-called—the pathologic findings are *nil*; and we have no fundamental remedial measures to arrest or cure arterio-sclerosis—which is now regarded as a progressive disease, inevitably fatal. All nervous disorders are treated between the two extremes indicated by "rest" and "exercise," and includes drugs, electricity, baths and massage—frequently with Christian science, psycho-therapy, mental healing and

osteopathy on the side, but certainty as to the outcome is conspicuous by its absence—the causative factor having been overlooked, or neglected.

The Milk in the Coconut.—A statement to the effect that most disorders of nutrition—gastro-intestinal catarrh, the indigestions along with “summer complaint” of children, are due to magnesium infiltration, would doubtless be more favorably received, inasmuch as there is a direct relation between indigestion and the magnesium salts contained in the various food-stuffs. In other instances mentioned, the deductions, to the general practitioner, are inexplicable—they cannot understand how the milk gets into the coconut. In preparing this sketch, therefore, it seems wise and expedient to develop the underlying, fundamental principles with sufficient technical detail from both the clinical and scientific viewpoints to enable the physician as well as the non-technical reader to verify the conclusions by observation, while the physiologic chemist undertakes a laboratory demonstration.

The writer is encouraged, or prompted—not impelled—to adopt the above course with the object of securing at least a moderate degree of uniformity in the line of treatment—first, for the purpose of verification, and second, as a means of comparison. Thus, we shall avoid the unkind (?) criticisms, such as Murphy sarcastically hurled at his confreres who pretended to treat so-called “general peritonitis;” one urged opiates, another catharsis; one gave fluid by the mouth, another by hypodermoclysis, and a third none at all; one elevated the foot of the bed, “to promote absorption,” and another set his patient up, “to retard it.” However, some one must blaze the way, but when the trail is struck and the field once fairly opened, cultivation will be rapid and thorough—the laborers plenty and the harvest abundant.

A Malady Easily Recognized.—Although the definition seems technical, it is descriptive and comprehensive, certain well known tests being sufficient to confirm the diagnosis.

Rarely is this diathesis mistaken for calcific metamor-

phosis, the symptoms subjective and objective, being well marked and easily recognized. Still, magnesium infiltration so deranges the cellular activities that the victim becomes prematurely aged, showing also the well known senile changes characteristic of calcareous degeneration—giving the symptom-complex. It is a constant factor in all diseases, both acute and chronic, the chief characteristic or symptom being erethism, but may be studied to best advantage in chronic cases, allowing the observer ample time to note the effects of medication—without danger to the patient—most physicians being averse to experimental investigation—although Dubois says the only difference between veterinarians and physicians is in their clientele.

Physiology and Pathology.—Analysis coupled with synthesis is not only convenient, but offers the most practical method available for developing both the physiology and pathology of the morbid complexus designated magnesium infiltration.

The Blood and Protoplasm.—A preliminary examination of the blood and the protoplasm as to their composition and functions will serve to elucidate the various questions likely to arise when deviations from normal are considered.

Normal blood is a red fluid, alkaline in reaction and has a salty (saline) taste, the specific gravity being 1.055, slightly heavier than water. The alkalinity is diminished in all chronic diseases, such as rheumatism, gout, migraine, tuberculosis, and notably in diabetes mellitus, where it ranges from 30 to 50 per cent. below normal, thus lessening oxidation, the oxygen-carrying capacity being correspondingly decreased. Diet is also an important factor, a diet deficient in the alkaline mineral matters, or one largely confined to proteids, leading to diminished alkalescence, impairment in nerve force, susceptibility to acute diseases with lingering convalescence, and in advanced age, the symptoms of general debility. For the most part, however, these effects and symptoms are merely the result of impairment in the cellular activities, the diminished alkalescence, with its concomitant, suboxidation, having favored development of the magnesium

diathesis—by or through which the normal metabolic changes are hindered.

Organic and Functional Disorders.—Although varying in degree in the different organs, the tissues are normally alkaline, so that an abnormal reaction of the body fluids tends to interfere with function, and may eventually lead to localized death of the tissues, usually referred to as organic disease. Thus, magnesium affecting the brain structures as a result of simple acid excess may be only sufficient to create slight nervous irritability in the young adult, while the same condition in a man over fifty years of age, or a woman at the climacteric, would most likely lead to a “nervous breakdown.” But such manifestations, especially among men and women who occupy positions of trust and responsibility, or who are brought into the lime-light by reason of their political prominence, their accomplishments in literature, science and art, or their achievements as philanthropists, inventors or financiers, are of such common, everyday occurrence that we have come to regard them as providential. In truth, our vaunted twentieth century civilization is in such close proximity to the line of demarcation between heathen fatalism and bacteriologic fanaticism that the situation is precarious.

In addition to the derangements of function coupled with organic changes, as a result of magnesium infiltration affecting adults, brief reference should be made here to the frequent manifestations of this diathesis in children, even before they are able to walk. As a class, they are characterized by more or less pronounced erethism, and when school duties are imposed upon them the absence of physiologic equilibrium is usually well marked. And besides abnormal mental activity, we generally find various physical defects—spinal deviations along with chest deformities, and notably abnormalities of the pedal extremities—twisted heels, flat-foot, with inward or outward pointing—all of which may be traced to deficiency of alkalinity in the blood, with the consecutive magnesium infiltration.

A careful study of the blood itself will doubtless put the

reader in a more favorable position to appreciate the importance as well as the advantages arising from investigations which aim to overcome, correct, or obviate the development of such conditions as above described.

The blood represents one part to thirteen of the body weight. The fluid portion, called plasma, constitutes sixty per cent. of the whole, the remainder, forty per cent., representing the corpuscles, red and white. The blood plasma contains nearly ten per cent. (0.098) solids, composed of proteids, serum albumin, serum globulin, fibrinogen, together with various salts, sodium, potassium, calcium and magnesium—in combination with chlorine, phosphorus, and carbon dioxide, as chlorides, phosphates, and carbonates.

The blood also contains urea, uric acid, fats, dextrose and cholesterin, the latter a monatomic alcohol, supposed to result from molecular changes in the nerve structures, perhaps because it is usually the nucleus of gall-stones, these concretions being found mostly in literary persons and those engaged in sedentary employment—teachers, authors, editors, bankers, lawyers, ministers and the like—a great majority of the cases being found in women, where dress evidently is a controlling factor. In health, the excretion of urea, through the kidneys, amounts to five hundred grains daily, approximately, the output of uric acid being ten grains or less, while in the case of uric acid diathesis, the proportions are reversed, due to diminished alkalinity, which interferes with oxidation.

Red and White Corpuscles.—The red corpuscles are non-nucleated, elastic, biconcave discs, about one thirty-two hundredth of an inch in diameter, composed of water (69 per cent.), with hemoglobin (29 per cent.), embedded in the stroma, several other proteids in small quantities, together with salts and extractives. It is their function to take up oxygen—which readily combines with hemoglobin to form oxyhemoglobin—in passing through the pulmonary apparatus—carrying it to the minute arterial twigs (arterioles and capillary vessels), where the oxygen is exchanged for carbon dioxide—carbonic acid gas—a waste product. This is called

the respiratory function of the tissues, a factor of paramount importance if we desire to maintain health and avoid the condition known as suboxidation.

As compared with red, the white corpuscles (leucocytes), are less numerous and larger, although they vary in size, shape, composition, structure and function. They are nucleated masses of granular protoplasm, capable of ameboid movement, possessing certain peculiar, inherent, phagocytic properties, so that an examination of the blood under the microscope enables us to confirm diagnosis in complicated cases, or foreshadows favorable or unfavorable changes in serious diseases, such as diphtheria, typhoid fever and pneumonia, besides affording a wide range of information in all forms of disease. They are developed from the lymphatic tissues, also the spleen and bone marrow, and include large and small lymphocytes, transitional and polynuclear leucocytes, the latter being subdivided into three types, neutrophile, eosinophile and basophile, depending upon the reaction of their granules to certain stains. Myelocytes are large, pathologic cells partaking of the character of those just named, the relationship being determined by staining.

Chemically, the leucocytes contain albumin, globulin, fat, glycogen, nuclein, a nucleo-proteid, and various salts, together with a mother-body of the fibrin ferment, the latter enacting a special role in producing coagulation of the blood. Thus, in the case of superficial bleeding, as soon as the blood is exposed to the air, the mother ferment is liberated—by disintegration of the leucocytes—and combines with the fibrinogen to form fibrin, producing a “clot.” A similar action may take place in the tissues, in the brain or any of the organs, giving rise to a “tumor.” The hemorrhage may lead to “simple” inflammation; in case bacteria gain access to it, “infective” inflammation occurs, with marked constitutional reaction.

The inner coat of the blood vessels (intima), is also believed to possess some peculiar influence in preventing coagulation, although it has been shown that certain constitutional

states have an inhibitory action—low temperature, carbon dioxide in excess, death from lightning and hemophilia, or “bleeder’s” disease. Certain foreign substances, when introduced into the system, also have this effect, such as leech extract, oxalates, neutral salts in excess, and the same is true of proteoses and peptones, whether employed hypodermically or escaping into the circulation as a result of digestive insufficiency.

Nuclein is believed to possess ferment properties, acting as an antiseptic and supplying nutritive pabulum—it increases the functional activity as well as the physical energies of the protoplasmic cells. It is referred to as “the chief of the defensive proteids,” substances which confer immunity from disease.

An important function of the blood is to equalize the body temperature, heat being generated by glandular and muscular activity and regulated by a supposititious thermic centre in the brain. Further, the blood carries nutrient material, notably proteids and salts for the upbuilding of the tissues, involving a chemic and physiologic change, and at the same time, converting the inert substances produced in the processes of digestion and absorption into living, organized protoplasm.

The protoplasm (cell) is therefore the primordium, the unit in both animal and plant life—because it is the first organized structure possessing the physiologic characteristics of life—nutrition, excretion, motility, reproduction and response to stimuli, the latter being included under four separate divisions, namely, electric, thermic, mechanic and chemic—and to this should be added a fifth—dirigation.

Blood Plasma.—Various changes take place in the blood plasma, even before the frank symptoms or manifestations of disease appear—to call for medical treatment—such as excess or deficiency of water, excess or deficiency of fibrin factors, excess or deficiency of salts, the presence of fat droplets, also melanin, a metabolic pigment containing sulphur—rarely iron—found in Addison’s disease—the skin is bronzed—and in melanotic tumors. Nevertheless, it is

a product of cell activity and is found under normal conditions in the choroid coat of the eye, the skin, the hair and the muscles. The plasma may also contain dissolved hemoglobin (hemoglobinemia), but the most significant change as related to the present inquiry, is connected with abnormalities in alkalinity.

Hemoglobin and Derivatives.—The corpuscular elements of the blood are liable to various deviations from normal, some of which are conservative, or reconstructive; others are abnormal, although its integrity in the main depends upon the alkalescence and stability of the hemoglobin. The latter is a crystallizable, proteid-like substance containing iron. It breaks up into hematin and globin on the addition of an acid or an alkali, and when certain drugs are administered in large doses, notably antifebrin, methemoglobin is formed, by which its oxygen-carrying capacity is lost, the blood becoming chocolate-colored, when death follows from asphyxia. Other derivatives of hemoglobin include hemin, hematin, hematoidin and hemato-porphyrin. It readily unites with oxygen and other gases. Thus, when an open gas flame is allowed to burn in a room not properly ventilated, the oxygen unites chemically with the carbon, forming carbon monoxide (CO), a chemic product, which is irrespirable in the proportion of three per cent., death resulting from asphyxia. In this connection, it should be mentioned that respired air in a close room is not fatal until the carbon dioxide (CO₂)—a mixture—measures ten per cent., although open lights—gas, lamps, and candles—become dim before this point is reached. As this gas is heavy and not readily diffusible, the lower stratum is more poisonous than the upper—a point worth considering in ventilation, a lost art.

Aëration and Ventilation.—Aëration of the human body, however, is far more important than ventilation of rooms, and yet few people understand its advantages, not to mention the necessity—shown by the surprisingly large number who begin coughing as soon as they get out of bed, keep it up at irregular intervals throughout the day,

a constant reminder of their ignorance—or laziness. While the aborigines and half-civilized tribes may be excusable for negligence, lack of knowledge is no excuse in modern times, since the profession is ever on the alert to protect the public, not only against external causes, but there is also a popular notion that doctors are constantly on the outlook to protect their patients and the general public against themselves—to the end of maintaining health and promoting longevity. Indeed, there is at present a systematized effort on the part of the medical profession and the laity combined to “stamp out” disease, and while much has been accomplished in the recent past, there is still much left undone, especially with regard to individual education.

An Apotheosis of Medicalism.—What with Christian science, mental healing, psycho-therapy and other movements, the twentieth century seems destined to witness an apotheosis of medicalism more sweeping than the deification of the “germ,” which has so long been regarded as the *ultima thule* of the profession. Still, these tidal waves are not without benefit, and in the case of bacteria, we do not under-rate their importance, now that we understand their character, functions, and dangers. As regards the occultisms referred to, we should follow in the same lines, adopting Macaulay’s plan—to “explode the occult by explaining it,” and that is substantially what the writer has attempted in various papers upon this important topic, exposing the mythical tenets of empiricism by bringing them within range of the modern scientific search-light to explain that there is no phantasmagoria or mysticism in medical art.

Respiratory Function of the Tissues.—In order to give this discussion a practical turn, it will be advisable to consider briefly the respiratory function of the tissues in connection with suboxidation, their inter-relations and dependence upon alkalescence.

Physiologists are in agreement as to alkalescence being the normal condition of the tissues while the pathologist is equally positive that diminished alkalescence is abnormal. The clinician, therefore, should take a comprehensive view

of the various phenomena likely to intervene between the two extremes. He prescribes remedies and advises treatment for the symptoms presenting, according to the conventional methods laid down in text-books, oblivious to the fundamental, underlying causes, the suboxidation and diminished alkalescence which hindered tissue respiration and finally precipitated the attack of illness. Of course, quite a number of physicians are acquainted with Loeb's experimental investigations, showing that "stimulation" produces alkalescence—which is of temporary benefit in relieving symptoms in chronic cases and even effects a cure in the early stages of many diseases. I refer here to the judicious employment of electricity, but how many operators in this special branch understand that their success or failure depends upon their ability to produce an alkalescence of the tissues sufficient to promote the dissociation of the magnesium?

Diminished Alkalescence.—As a matter of fact, all forms of chronic diseases, are dependent either directly or indirectly upon magnesium infiltration, as a result of diminished alkalescence and suboxidation, a statement which can be fully verified by physiologic investigation and confirmed by clinical observation. In addition, it may be said without the fear of successful contradiction that all acute diseases are modified in severity and prolonged by or through the presence of magnesium deposits; and it is also safe to claim that in every instance, nervous disorders are precipitated and their intensity determined by the same cause. Such being the case, of course, there will be a furore to condemn these sweeping assertions, because their general acceptance would revolutionize medical treatment, but the physician who can comprehend this universal doctrine will be able to maintain the health of his patients and promote longevity through his knowledge relating to physiologic chemistry.

Edison's Work on Colloids.—There are numerous methods by which the truth of these claims may be established, but in this instance I will refer to certain evidence which is entirely outside of medical literature, and yet it is so closely related to my clinical investigations on this subject that I

think it extremely important. Of course, it is well known that Mr. Edison has been for a long time making experiments with a view to producing an efficient and practical electric storage battery. In fact, I have learned that two men whom he employed in this work made no less than nine thousand experiments and finally were compelled to give up because it "got on their nerves." In the course of a personal letter to the writer, his secretary says:

"It is curious that he [Edison] has found that the only way to remove organic colloids from strong solutions of alkali is by shaking with magnesium oxide and filtering. Why magnesium alone should do this is rather strange. This phenomenon was found by trying to prevent the frothing of the alkaline electrolyte in his storage battery."

The above statement throws a flood of light upon the clinical investigations which I have made relating to magnesium infiltration. It is well known that the nerve structure is composed of a colloid substance and water, and it is now believed that the colloid substance carries the positive electric current while the water carries the negative current. If alkalescence of the tissues be diminished to the extent of saturation, there will be no current. However, we have in the blood a certain body called oxidase, and I have assumed that this active oxidizing agent combines with certain magnesium salts to form the oxide; and here we have the magnesium oxide combined with the organic colloids of the nerve structure to act as an insulator, to hinder or interfere with the transmission of an electric current which is the force or energy that maintains the uninterrupted transmission of nerve impulses.

Transient Effects of Electricity.—Suppose we have a patient who suffers from magnesium infiltration affecting the nerve supply of the lower extremities. He complains of pain, tenderness, and various paresthesia, and this may go on for years without benefit from internal medication. Some one recommends that he put a small piece of copper in one

of his shoes and a piece of zinc in the other, and in half an hour all the unfavorable symptoms disappear. But they return shortly after the electrodes have been removed. Here is a child who is poorly nourished, or who is ordinarily healthy, or is extremely stout and subject to recurrent attacks of croup. A string of amber beads around the neck will cause all croup symptoms to disappear, and yet they will return on leaving off the amber beads. Here is a man who suffers from some chronic ailment with obscure central derangement of the nervous system. He goes to an electrician who gives him the static breeze for ten minutes or so, and his troubles disappear as though by magic. Similar results are attained in the treatment of chronic indigestion by means of electric belts, and some patients, who for years have had recurrent attacks of lumbago, find that these belts ward it off as long as they are worn.

Electro-plating from Magnesium Oxide.—The foregoing is sufficient to show in my opinion the advantages of electricity as a temporary expedient in the treatment of different forms of magnesium infiltration, yet from the fact that they are only of temporary benefit, it seems that they might be termed superserviceable. This conclusion is warranted from the fact that internal medication directed to the abnormal condition, together with the collateral treatment, will not only relieve the symptoms promptly, but there will follow complete recovery, inasmuch as collateral treatment should be directed to reestablish the normal physiologic equilibrium as regards alkalescence, which would thus prevent the nerves from becoming “electro-plated” with magnesium oxide.

Assuming that a case is made out, that magnesium oxide is produced within the body by the action of oxidase upon magnesium salts, and that this substance unites with the organic colloid of the nerve structure, impairing or destroying function, it is not so difficult to determine the causative factor responsible for the notorious infant mortality, especially during the summer season. Popularly known as “calcined magnesia,” this deceptive and deadly chemical

is almost universally employed as a "sedative," with the result that the children are subjected to a legalized euthanasia, or when recovery ensues, it is in spite of medical treatment, a sad commentary upon modern medicine and the twentieth century civilization. And yet, parents are suspicious, physicians claim to be skeptical—to cover ignorance—and there is a general consensus of opinion that it would be unwise to go contrary to tradition, and besides, it might be dangerous to employ such quickly acting remedies.

The Problem in Nutrition.—As a problem in nutrition, the conditions are extremely interesting, the complications diversified and the outlook indefinite, since it is impossible to determine in advance of treatment whether the irritation set up in the nerve structures has brought about organic change. The general plan which I have found successful ("Magnesium Infiltration," *Wisconsin Medical Recorder*, 1909), embraces three distinct lines of treatment, as follows:

- (1) Restore the digestive capacity.
- (2) Neutralize acid excess.
- (3) Promote magnesium dissociation.

A brief survey of the conditions presenting well marked evidences of magnesium infiltration in some of the more common disorders, to be offered in subsequent pages, will suffice to demonstrate the fundamental basis of the investigations.

There is nothing difficult for the physician to understand with respect to the "lines of treatment," suggested, either as regards diagnosis or medication, since it is a simple problem to determine the principal or dominant factor responsible for indigestion. For example, in the case of insomnia, when the patient complains of inability to sleep before midnight, there is a disordered condition of the stomach, due to the decomposition of nitrogenous foods (meats), along with the bacterial flora, the latter, or their toxins, entering the circulation and acting as an abnormal stimulus to the brain cells. Again, when the insomnia

occurs after midnight, these patients being awakened along about two or three o'clock in the morning, we know that the intestinal digestion is at fault—there is imperfect digestion of the starchy foods, with fermentation, and in addition, probably excessive microbic activity with absorption of toxins through the medium of the lacteals.

In both instances, regulation of the dietary, cutting off meats in the first instance and starchy foods in the latter, would produce appreciable benefit, but it would require an interminable period of "rest" and "exercise" to effect magnesium dissociation, a chemic deviation having been brought about by or through the long continued acid excess, incident to the indigestion. In other words, the physiologic deviation has given rise to certain definite and demonstrable chemic changes in the body cells, including nerve cells, in consequence of which normal function is impaired—and this is the problem in nutrition.

Mass Action.—The law of "Mass Action" was first demonstrated (1867), by Guldberg, a Norwegian physicist, and Waage, his son-in-law, a chemist. Later, Van't Hoff, the celebrated Rotterdam chemist, in an extended series of investigations proved the correctness of the theory. His "Studies in Chemic Dynamics," covers the whole subject of chemic dynamics, and chemic equilibrium, placing it for the first time upon a scientific basis. The deductions from these investigations together with the demonstrations available from plant life have enabled me to present the subject of magnesium infiltration upon a strictly scientific foundation.

Peculiar features, not to be overlooked in this connection, relate to the universality of this chemic deviation in both sickness and apparent health, together with the facility of demonstration—by the results of medication calculated to promote magnesium dissociation. Further, a failure to secure the usual or anticipated reactions proves the hopelessness of medical treatment—in such cases as infantile paralysis, and other varieties or types of paralysis, neuritis, neuralgia, and neurasthenia, along with the chemic deviations

responsible for chorea, epilepsy, locomotor ataxia, arteriosclerosis, and so-called heart failure. Indeed, there is no "missing link" required to show that magnesium infiltration is the dominant factor in nutrition, because the chain of evidence is complete.

The reader should not infer, however, that this chemic deviation designated "magnesium infiltration" is a disease *de novo*; rather, it is an effect, and will be variously manifested at different stages in its progress, the cause being readily traceable to digestive disturbances arising from dietetic errors. That is, defective assimilation, primary and secondary, is the original cause, and it is by a critical study of disorders of metabolism that we shall effect a solution of the chemic problem in nutrition.

A STUDY OF METABOLISM.

Definition—Normal Nerve Stimuli—Electric Conductivity—Heat and Cold—Mechanic Stimulus—Intrinsic Merits of Osteo-therapy—Chemic Stimulus the Crux—Adaptability of Glandular Structures—Abnormal Chemic Stimuli—Acid Excess Hinders Intestinal Digestion—Psychic Stimulus—Tropism: Radio-activity—Physiologic Action—Atomic Nature of Radium.

Definition.—Metabolism is a comprehensive term employed to cover nutrition, and includes all the various intricate chemic and physiologic processes incident to absorption and excretion—anabolism, or building up, and katabolism, or breaking down. The chemic change is usually an hydration, dehydration, reduction or oxidation, while the physiologic change arises from the cellular activities, inert organic substances being converted into living, organic cells, called protoplasm. Thus, diet is an essential element in deranging metabolism—when it consists principally of meats, with disordered digestion, the tendency is to an acid excess, or even uric acid, with symptoms of gout, lithemia, rheumatism, and neuralgic attacks.

As shown, later on, this deviation may be readily overcome and the causative factor removed—by correction of the impaired digestion, regulation of the dietary, neutralizing the acid excess and promoting dissociation of the magnesium deposits to which a diminished alkalinity of the body fluids has given rise. Except in extremely chronic cases does this treatment fail to afford prompt relief, and with reasonable care in the dietary, the benefit is permanent.

A study of the principles of nutrition necessarily embraces an inquiry into the status of the physiologic and chemic reactions, since the reactions are brought about through the medium of what are termed nerve stimuli.

Normal Nerve Stimuli.—All forms of life, to attain fruition, require or demand certain factors, or, shall we say, accom-

paniments, sympathy and stimulus. No more is plant life successful in a barren soil surrounded by weeds than a child arrives at maturity clothed with intelligence and noble impulses as a result of continued association with vice, showing the natural tendency to reversion in the absence of sympathy and stimulus. Of course, it is possible to have too much condolence, agreement or tenderness, and it is a fact that lack of sympathy is frequently a more serious obstacle to advancement in the individual than absence of stimulus, since there is a constant, unfavorable influence which tends to produce obsession in the more highly organized brain structures, a subject more directly within the province of the psychologist than the physician. Therefore, under the head of normal nerve stimuli we have to consider the physical and physiologic bearings in their relation to metabolism, while the psychic factor should not be overlooked.

The human body may be compared to a dynamo, which holds or possesses power for performing work; in other words, it contains potential energy which may be employed or developed in the form of kinetic energy, and here lies the gist of successful treatment—regulating and controlling the cellular activities in accordance with their known response to stimuli.

The normal nerve stimuli include electric, thermic, mechanic, chemic and psychic, apparently five separate divisions, but so intimately related and interdependent that we must consider them collectively as well as individually. For example, the employment of electricity has attained prominence owing to its efficiency as a stimulus, but when we come to a critical study of its so-called physiologic action, we find that it includes other than the mere superficial effects. Thus, the faradic current causes muscular contractions, a mechanic stimulus; and the muscular contractions in turn produce chemic changes or reactions, always attended by more or less elevation of temperature. Besides, the electric, mechanic, chemic and thermic, there follows the psychic stimulus, conscious or sub-conscious.

The effect of galvanism is similar—parallelism without identity—electrolysis being produced, with softening or chemic decomposition at the negative pole, making it available for the treatment of tumors and malignant growths.

The special advantages claimed for the high frequency electric current are that it is free from painful effects upon the tissues and that it effects the resolution of obstructions, although it produces a degree of heat upon the deep seated tissues which could not be sustained if applied locally. Advocates of the high frequency current assume that elevation of the local temperature without pain, attended with the most marked evidences of improved nutrition, demonstrates its superiority over the employment of external heat. Numerous well qualified operators, having failed to obtain any satisfactory therapeutic results, condemn the method, claiming that any apparent benefits are due to psychic influences—forgetting the logical deduction that they themselves should have witnessed the psychic effects.

An explanation should be forthcoming to account for failures, and would be, were the physiologic action more fully comprehended; hence, it may be interesting to note briefly the claims advanced, namely, that the benefits are due to chemic changes in the tissues, as evidenced by the increase in the solid constituents in the urine, the increased elimination of carbon dioxide together with an augmented heat production and greater activity of the sweat glands, all of which tend to promote nutrition in general. It is claimed also, that arterial tension is lowered, that this peculiar current counteracts the venom of serpents and lessens the virulence of bacteria and their toxins.

Electric Conductivity.—While this is a general statement covering the effects, it by no means throws light upon the reasons for the physiologic changes. Perhaps it would be well here to state that one of the most important functions of the high frequency current is increase of the electric conductivity of the body fluids and tissues. No better illustration of this scientific fact can be found than is shown

below, the record of a series of experiments carried out by Emma Lootz and Alice Weld Tallant,¹ to determine the relation of the electric conductivity of blood serum to its alleged bactericidal power. The tabulation shows the variations in electric conductivity at different temperatures, from 24° to 70° C., the material being kept at each temperature long enough to insure a constant reading.

Concluding the experiment, the serum was cooled to 38° C., approximately the normal temperature of the body, when the electric conductivity remained practically unchanged, indicating that heating had caused no physico-chemic deterioration.

ELECTRIC CONDUCTIVITY—BLOOD SERUM

(At varying temperatures.)

24°	11.323	55°	19.283
30°	12.753	56°	19.643
38°	14.696	57°	19.881
50°	17.873	58°	20.133
51°	18.160	59°	20.410
52°	18.526	60°	20.730
53°	18.800	70°	23.253
54°	19.053	After cooling, 38° . . .	14.743

This is additional evidence in favor of the working hypothesis underlying magnesium infiltration, applying especially in the case of paralysis. Thus, when the tissues are surcharged with magnesium, a non-conductor, the electric conductivity is diminished, oxidation retarded, and elimination of waste products prevented—in consequence of the disordered cellular activity, this effect being similar to that which follows the emanations of radium. In addition to this should be mentioned the fact that the high frequency current is effective in relieving local manifestations of constitutional derangement. When the constitutional derangement is emphasized or intensified by or through diminished alkalinity of the tissues, the benefits must be correspondingly decreased; again, when the local obstruction is composed

¹ Johns Hopkins Hospital Bulletin, September, 1900.

principally of inorganic substances, such as lime and magnesia, necessarily resolution will be comparatively limited—it can only affect the organic substances with which the inorganic material is combined. Thus, we are enabled to give a plausible explanation for the efficiency, and at the same time there is brought forward a reasonable basis for the failures.

A word more in regard to the character and effect of the high frequency current as employed in the treatment of disease. Absence of pain is due to the rapid oscillations—they produce no sensation upon the nerve, and hence no action upon muscle, although the current carries potential energy sufficient to illuminate several sixteen-candle power lamps. Thus, electricity, considered as a stimulant, is converted into heat; heat, in turn, changed into chemic action, this being followed by further chemic change, modified by the associate nerve stimuli and regulated by or through the normal resistance inherent in the human organism. Such being the case, would it not be the part of wisdom to study the chemic nature of the complications with which we are called upon to deal, endeavoring to effect stimulation by more exact, less complicated and more direct methods? The difficulty in regard to electric stimulation hinges upon the lack of knowledge concerning its proper employment. Thus, the unfortunate results attending the use of the *x*-ray in medical practice are such that patients fear it, while under proper regulations as to intensity, it is entirely harmless. Just as in the case of other remedies, it has been found that a large dose destroys the tissues, while a small dose enacts the role of a stimulant—it augments cellular activity.

Heat and Cold.—Heat and cold are equally valuable in suitable cases and the employment of one or the other may prove the connecting link in the successful termination of a case, but we must not forget their limitations—also their relative value as adjuncts to promote chemic reactions.

It will be sufficient to discuss briefly in this connection the employment of water as a thermic stimulus—thermo-

therapy. History credits Father Bernardo, of Malta (1724), as being the first to grasp "the broad conception that water had curative relations to the whole realm of disease," although his recommendations were confined to ice-water alone. At the present time the use of water as a remedial agent—for its stimulant properties in the treatment of disease—hinges principally upon the work of Brand, who has put forward a "system," which is less extensively employed now than a decade ago, and usually with some modification to conform with the personal equation of the individual physician.

The various methods by which heat and cold are applied as nerve stimuli may be outlined as follows (Hunter):

1. Packing, hot and cold, general and local, sweating and cooling.
2. Hot air and steam baths.
3. General baths, of hot water and cold—the latter used in typhoid.
4. Sitz, spinal, head and foot baths.
5. Bandages (or compresses), wet and dry.
6. Fomentations and poultices, hot and cold, sinapisms, stupes, rubbings, hot and cold.

In addition to the above, should be mentioned mud or clay baths, enemata, hot and cold; also the bidet in like manner.

Taking a comprehensive survey of thermo-therapy—from a modern viewpoint, as represented by hydrotherapy—it will be apparent that the discoveries in bacteriology have more than dimmed the luminosity of deductions advanced by its most enthusiastic supporters, since bacterial infection introduces a new and hitherto unconsidered factor in the treatment of disease—the chemic problem.

Critical analysis of this question, taking the full bath, hot or cold, as an example, brings out a number of patent facts, easily recognized by the most casual and indifferent observer. Thus, a momentary cold plunge enacts the role

of stimulant, but the cold bath long continued, may produce symptoms of profound depression. The effect of a quick, hot bath is that of a sedative, but in the case of debility or great prostration, say during convalescence, a moderate prolongation of the hot bath acts as a stimulus. Cold, therefore, may be employed to produce heat—as an excitant or stimulus, while heat, similarly employed, has a cooling and soothing effect. In both instances, the effect of heat and cold, momentarily employed, is to augment cellular activity, to increase oxidation and promote elimination, in short, to complement tissue change, by favoring chemic action, a deduction which is logical, practical and available in the absence of bacterial infection. In the case of typhoid fever, for instance, the benefits are indirect rather than direct, remote instead of immediate, because the infection is found in the blood and lymph channels and also in the intestinal tract. By means of a harmless agglutinin,¹ together with suitable medication to correct the abnormally acid condition of the body fluids, the cold bath should prove an invaluable adjunct in the treatment of this disease, lessening its severity, shortening its course, and greatly reducing the mortality.

We must bear in mind that the full bath, hot or cold, is distinctly a health adjunct, the function of the skin being complementary to assimilation, primary and secondary. Elimination of excrementitious substances, liquid and solid, through the cutaneous envelope, exceeds the amount discharged through the bowel in the proportion of three to one. The physiology based upon making the skin perform a vicarious function and thus lessen the work thrown upon the alimentary tract is certainly lacking in consistency on theoretic grounds, while its practical application is attended with serious drawbacks, unless the proposition is considered from the standpoint of the veterinarian. Apparently, the traditional doctrine of purging is still rampant and defiant.

¹ The substance in the blood serum producing the agglutination phenomenon or clumping of bacilli in the Widal reaction.

The harshness of this criticism will be modified, and I shall dodge the charge of iconoclasm by suggesting a critical investigation of the chemic problem from a clinical standpoint.

In respect to the traditional poultice must be entered an emphatic protest, its employment being not only useless, but positively harmful, and besides, it often leads to serious complications in the case of boils, abscesses and carbuncles. It supplies heat and moisture and furnishes a nidus for the growth and multiplication of bacteria, which later, may find access to the general circulation, giving rise to septic infection (septicemia). No modern-trained physician would endorse the application of a poultice in the case of ptomain poisoning nor hydrophobia, because of its utter foolishness.

Mechanic Stimulus.—Mechanic stimulus is deserving of careful investigation, for various reasons, among which may be mentioned its intrinsic merits, the rapidly increasing demand for it—and further, because of its limitations. Just as the practice of medicine gradually slipped away from the priest, and as bleeding was lost to the barber and combined with first aid to the injured to round out surgery, so the ancient bone-setter gave place to the osteopath, and as in the case of all innovations, osteo-therapy has met with bitter opposition. While massage has advantages as a mechanic stimulus, and machines are employed for a like purpose, there is nothing superior to the human hand for the purpose of discovering and correcting displacements, or demonstrating and relieving muscular contractions and adhesions—and such is osteopathy.

The Intrinsic Merits of Osteo-therapy.—The intrinsic merits of osteo-therapy are due to the fact that nature, however conservative, frequently bungles—physical growth as well as mental development may be hindered, deviated or arrested. Now, since we have neurologists, alienists and psychologists for mental derangements, why not have bone and muscle doctors for physical deviations? Here is a comely child, ten years of age, utterly lacking in mental capacity (feeble-minded), except the natural instincts;

another child of the same age has "buckling" of the spine (rickets), while mentally almost precocious. Who shall say what could be accomplished in such cases if taken in time by the psychologist and osteo-therapist respectively, when we take into consideration the notable advantages afforded by chemistry—to reorganize, reconstruct and recoup the loss arising from impaired, defective, or deficient stimulus? Coupled with the benefits to be derived from chemic stimulation, osteo-therapy is invaluable; alone, it may, and frequently does, accomplish remarkable results, but there is reason to believe that in many instances the commercial end of the problem threatens to obscure the professional attainments of the operator—"The voice is the voice of Jacob, but the hand is the hand of Esau."

The rapidly increasing demand for mechanic stimulation is a story by itself—a story with a moral as well as a problem. To-day, the rising generation is brought up in accordance with the teachings of the cereal manufacturers, about on a par with present day medical practice, fifty per cent. of the prescriptions on file in the drug stores being for proprietary medicines. Physicians who condemn osteo-therapy must be regarded as arbitrary and unreasonable, even bigoted, since their opposition is founded upon superficial knowledge rather than upon reliable information and personal observation. For example, it is well known that many ailments, both acute and chronic, are due to failure in nutrition, or deviation from normal affecting the spinal vertebræ—headache, neuralgia or moist palms, from displacement or wasting in the bones of the neck; indigestion liver trouble, and kidney disorders from like complications lower down; and besides, we frequently find that spinal defects demonstrate the presence of magnesium deposits in the nerve structures, which osteo-therapy ameliorates, but does not cure. The constitutional involvement is amenable only to chemic stimulus—antidotes?

The limitations of mechano-therapy are necessarily inherent. Like electricity and heat and cold, it is subsidiary to chemic stimulation, but it is none the less essential for

the correction of deviations and reëstablishing the normal chemic reactions.

Chemic Stimulus the Crux.—Now, since electric, thermic, and mechanic stimulation all converge to produce chemic reactions (stimulus), it follows that chemic stimulus is the crux, the puzzle or conundrum to be solved before we can accomplish any satisfactory results in determining the scientific basis of rational treatment. Indeed, it is the pivotal factor confronting us in our efforts to counteract, ameliorate and eradicate infection or disorder; hence, a brief consideration of the complications.

The first question coming up for consideration, one of paramount importance, relates to the possibility or probability of there being what might be termed a preponderating or dominating chemic status. If it can be established that we have to deal in general or in the main with a normal or generally prevalent chemic reaction, the puzzle is more than half solved. For example, we find that the normal reaction of the salivary secretion is alkaline, while that of the mucous glands is acid, both secretions being found in the mouth. Pursuing our investigations, we find that the reaction of mucus is constantly acid; that is, whenever we test the secretion of the mucous glands proper, the reaction is acid whether it be the nasal cavity, the stomach, the intestine, the bladder or the mucous membrane of the pulmonary apparatus. Indeed, the delicacy of the pulmonary mucous membrane has led to the belief that the tissues here are normally acid, but this is an error, and has evidently led to unfortunate deductions regarding the treatment of pulmonary and bronchial affections, since it has been demonstrated beyond question that the normal reaction of the body tissues is constantly alkaline. However, the general proposition is well established that tissue change occurs normally when it presents an alkaline reaction, all tissue being supported and rebuilt by the blood, whose integrity depends upon its alkalescence. Whenever derangement of function occurs, there is diminished oxidation, failure in tissue change and naturally this leads to acidity;

and not only do the glands of the mucous membranes carry off acid surplus, but we also have the kidneys actively engaged in the conservative process. In addition to this, we have the sweat glands and also the sebaceous glands of the skin, whose function it is to eliminate waste material, from a pound to a pound and a half of moisture and solid matter being removed every twenty-four hours. In the kidneys, for example, we have a glandular apparatus which removes acid from the blood together with the urinary water and solids, and this acid liquid is only separated from the alkaline blood by an extremely delicate membrane. When the kidneys have performed their function as far as possible, and the circulating blood still remains charged with acid, there is a gradual breaking down of the previously healthy tissue. Later, or consecutive to this, we have albumin appearing in the urine—followed by, properly beginning nephritis or Bright's disease, discovered by Dr. Bright.

Substantially the same conditions are found in the skin, the alkaline blood being separated or kept apart from the acid secretions by the delicate cellular structures which make up the various layers of the cutaneous envelope. Stimulation of the skin by means of electricity, or heat and cold, or massage can promote the activity of the cells—in other words, they act as normal nerve stimuli. The same is true of chemic stimulants; thus, a hot bath charged with an alkali such as bicarbonate of soda, will not only neutralize the acid which has accumulated in and upon the skin, because of its stimulating effect upon tissue change. In the case of psoriasis, which is attended with intolerable itching, by the addition of an acid together with calcium chloride, we obtain an effervescent water which produces a more pronounced chemic action than the plain bicarbonate of soda, since the magnesium deposits are dissolved by the action of the acid—carbonic acid—when the calcium particles take the place of magnesia, according to the law of mass action.

Apparently the evidence is conclusive in favor of the

supposition that the cellular chemic reaction is alkaline, and while the eliminated waste products are acid, it does not follow that the administration of acids is good practice, except under rare and unusual conditions—such as presented by senile decay.

Adaptability of Glandular Structures.—An interesting illustration, as showing the peculiar adaptability of glandular structures, is to be found in studying the functions of the stomach. Of course, the mucous glands of this organ produce the ordinary acid secretion, but during digestion we have a digestive fluid containing approximately 0.2 per cent. of hydrochloric or muriatic acid, a mineral acid. Now, it is well known that persons who suffer from dyspepsia likewise experience a sense of acidity; that is, they realize that a demand for alkalies indicates a surplus of acid. Hence, to overcome this defect, these patients have learned from physicians that they may safely and advantageously take bicarbonate of soda—an alkali—in liberal quantities. But, physicians who recommend this treatment, and patients who follow their advice, learn sooner or later that the treatment affords only temporary relief. In fact, it finally fails utterly to produce any apparent benefit, and this too, for the good and sufficient reason that the sodium content regularly combines with chlorin and lactic acid to form more hydrochloric acid, so that the patient becomes a more or less constant sufferer from what is termed hyper-chloridia. Weeks, months, and years have been frittered away in vain efforts to correct this hyper-chloridia or acid excess without any definite knowledge regarding the deleterious effects of the bicarbonate of soda which combined chemically to perpetuate the disorder.

Abnormal Chemic Stimuli.—In this connection it will be in order to take a brief survey of the effects of abnormal chemic stimuli, such for instance as we have just noted in the case of dyspepsia, where the hydrochloric acid arising or resulting from medication became the abnormal nerve stimulus. And if we were to follow up this idea it would result in exposing and demonstrating the folly of the present day medication in the treatment of catarrhal conditions

affecting the mucous membranes. The result of acid excess upon the kidneys has already been noticed; the evidence that acid excess is the dominating factor in the development of, as well as in the persistency in, the case of tuberculosis, is overwhelming; for all practical purposes, the same claim is warranted regarding the treatment of nasal and nasopharyngeal catarrh, because when acid excess is neutralized, improvement is immediate and marked, and with attention to the dietary, relief is permanent.

Acid Excess Hinders Intestinal Digestion.—Finally, we have left for consideration a study of the effects of abnormal stimulation upon the intestinal tract, the acid excess giving rise to persistent intestinal indigestion. In fact, intestinal indigestion follows hyper-chloridia affecting the stomach as night follows day. Digestion here under normal conditions is conducted under an alkaline or neutral reaction; hence, should the reaction be acid, digestion of starchy foods is delayed, and where we have to deal with hyper-chloridia—of the stomach—there will usually be more or less incomplete function of that organ, so that portions of the nitrogenous foods escape into the intestine. Of course, the pancreatic juice may be sufficient to complete this digestion, but usually we find that this work is very imperfectly performed, and as a rule there is decomposition (putrefaction). Along with this decomposition of nitrogenous food, the delay in the digestion of starchy foods leads also to fermentation, and were it not for the action of microbes in the lower bowel, which assist in completing the digestion, we should have serious difficulties to contend with.

Acid excess, therefore, hinders intestinal digestion; it leads also to fermentation with more acid; in addition to this, it favors the decomposition or rotting of nitrogenous foods, and these complications, of course, naturally lead to an increased demand for microbic action, a subject more fully considered in discussing appendicitis.

Before leaving this special topic, it seems advisable and expedient to make an effort to impress upon the reader the extremely unfavorable outlook as regards health when we

have to deal with acid excess as it involves the intestinal tract, because it strikes at the root of nutrition, and from this particular point, we find its effects in the way of radiation involving all the various structures and organs of the entire body. It is a condition which increases susceptibility to all infections and especially is it connected with the numerous deviations from health which we are called upon as physicians to treat. By recognizing and removing the cause of the disorder, we immediately overcome the derangement which is responsible for imperfect metabolism.

Psychic Stimulus.—While much has been claimed for the psychic influence, not alone as a potential factor in maintaining health, but as a prophylactic and curative agent in practically all disorders, this subject demands brief consideration. Starting with the patent fact that the mental factor is important, its significance dwindles when we observe the effect of medical treatment upon children and the insane. Consider this in contrast with the utterly unwarranted declaration of a popular author (Schofield), as follows:

“Indeed, so great is the mental factor in therapeutics, that it is not too much to say that inferior medical skill with a good and assuring manner is more likely to effect a cure than a superior skill with a diffident and depressing personality.”

Less aggressive but more fanciful and picturesque are the teachings of our French colleague (Jules Payot), who would “almost persuade” his readers to believe that psychic cogitation could mitigate or even dissipate an attack of typhoid fever, although he does not tell us how an infant in arms may ward off an attack of croup. Here is a quotation suggesting the contemplative ruminations and mental gyrations requisite to secure fertility in results—scarcely a practical theory in the case of insanity or even well marked cases of neurasthenia:

“Meditative reflection is marvelously fertile in results: It gives birth to strong, effective emotions; it transforms vacillating

tendencies into energetic resolutions; it utilizes the influence of the suggestions of language and passion; it enables us to get a clear glimpse of the future and to foresee the dangers arising from our own nature and to avoid the external circumstances of our environments that contribute to our natural indolence."

The modern apostle of psychic treatment, however, is Paul Dubois, a physician, metaphysician, and materialist of international repute, whose marvelous ability and tactful skill demand more than ordinary attention. Indeed, a careful study of his published utterances would lead us to infer that he had solved the riddle of human suffering and would revise the law of gravitation at the first opportune moment.

The following extract from his popular work (*The Psychic Treatment of Nervous Disorders*), is arranged in numbered paragraphs, the better to enable the reader to follow the criticism:

"1. A person is not neurasthenic in the same way that he is phthisical, uremic, cardiopathic, but he is neurasthenic just as he is lazy, undecided, timid, irritable and susceptible. Tell me please, what organic chemistry can explain these peculiarities of our psychic being?

"2. What is the toxin that makes of a poetic genius a Sadist or an invert? Do we bestow energy upon a patient who has lost his will-power by injecting glycero-phosphates into him, by washing his blood with mineral waters, by making his cutaneous vessels contract by a cold douche, or by nourishing him exclusively on pap? No. It is a question of mental conditions and of psychic peculiarities.

"3. These can be fostered by influences which are entirely somatic; but they can be equally influenced by educative efforts."

Now let us see what develops when these dogmatic and sweeping generalizations are analyzed and dissected under the search-light of modern science. Taking the paragraphs in regular order, the appended data will serve to indicate

more clearly the relative position and merits of psychic stimulus as a therapeutic agent, showing also the fallacies of its most enthusiastic advocate.

(1) In this paragraph we have a fairly complete description of the neurasthenic, "lazy, undecided, timid, irritable and susceptible," abnormal conditions not only explained, but demonstrated by inorganic chemistry, the symptoms disappearing when the magnesium deposits are displaced—by chemic dissociation in accordance with the law of mass action, or disintegrated by or through the medium of chemic stimulus acting upon the body cells.

(2) Instead of a toxin being the cause for loss of energy and will-power, more frequently, if not generally—aside from atavism and heredity—the deviations from normal are directly traceable to the defective innervation, or insulation, incident to the factitious deposits, which interfere with or hinder the uninterrupted transmission of nerve impulses. Remove the obstructions by chemic stimulus, and we reëstablish normal molecular changes in the nerve structures, insuring mental equilibrium together with subsidence of the psychic peculiarities—and that too, without the glycerophosphates, the mineral waters, the cold douches and the pap, all these measures being superficial and shifty expedients born of ignorance, and dialectics, except as an adjuvant, should be relegated to the same category.

(3) Somatic or bodily influences should not be overlooked or neglected, and the same is true of "educative efforts," but to depend upon these alone, excluding the advantages offered by stimulation of the chemic activities, is merely to fold our arms and maintain a position of "masterly inactivity."

These claims are fully substantiated by the case records enumerated in subsequent pages, the patients themselves being the best evidence of the correctness of the diagnosis, as well as conclusive proof that the deductions are logical and warranted—by the results of treatment.

What incentive, therefore, to speculate for months on the outcome in neurasthenia, when chemic treatment for a

week or ten days suffices to demonstrate its efficiency in correcting the deviation from normal.

What excuse can be advanced for seven weeks of "rest treatment" as an expedient in the case of brittle arteries, when ten days of chemic treatment—without rest—will actually produce the hoped-for results with a degree of certainty approaching mathematical precision?

Who shall have the temerity to advocate a term of six months in dialectics for a chronic rheumatic when it requires but three days to neutralize acid excess and reestablish normal tissue change, with complete relief from the most forbidding symptoms?

Finally, what can be said of medical science when nineteen doctors in ten years fail to relieve a case of gastralgia—neuralgia of the stomach—while the twentieth effects an immediate and lasting cure from a single visit, except that the nineteen were engaged in "active practice"?

Tropism.—The response of both animals and plants to external stimulus, called tropism, is both interesting and instructive, inasmuch that it shows a measure of mentation, together with both physiologic and chemic activities independent of the nervous system—unless we assume that every living cell has some form of communication with the central nervous system, and that owing to environment it is qualified or prepared to perform certain special functions. While we cannot assign to clams, oysters and worms a distinct psychic endowment, not even instinct, there is no doubt of their tropisms, or automatic response to external stimuli. Various illustrations are available in proof of this statement. Thus, a plant bends toward the light, or a tendril, as growth advances, leans toward a rod or a piece of twine; a hunter is never lost in a forest when he can distinguish the tips of the hemlock trees bent eastward; so likewise a moth is stimulated to dash into a flame, not by instinct, but as a reason of tropism—heliotropism. As a result of warmth, chemic changes take place in the caterpillar and set it in motion; volatile substances within the body of the blow-fly start the egg-laying mechanism, additional evidences of tropism—chemo-tropism.

The amebæ, simple protoplasmic bodies (protozoæ), having a nucleus and nucleolus, possess numerous properties, all functions being shared by every part of the organism. "An ameba, for example, it is well known, is capable of finding, seizing, devouring, digesting and assimilating food, has a special provision for collecting fluid and pumping it out of its body, respire by its whole surface, moves about apparently where it will, exhibits a sensibility to tactile impressions and reacts in all probability to smell, if not to sound and light," thus exhibiting what might be termed multi-tropism. Moreover, the ameba is susceptible to chemic influences, a scientific fact worthy of note in connection with the recent investigations of Ehrlich and his pupils in the therapy (chemo-therapy), of syphilis—an additional illustration of the correctness of the theory of chemo-taxis. Loeb advances the theory that all movements of the lower animals are due to tropisms, and that these act through chemic influences upon the body cells.

These illustrations are brought forward to emphasize the importance of considering the physical and chemic properties—or functions—of the protoplasm, the ultimate cells or units comprising the human body, since it displays in no uncertain manner the significance of the chemic activities in promoting and maintaining normal adjustments and adaptation.

Radio-activity—the transformation of atoms (?), is an exceedingly interesting topic, from the viewpoint of metabolism, and although imperfectly understood, deserves consideration in the present discussion. Kreuznach, Germany, is credited with the honor of establishing this new industry upon a commercial scale. The artificial mineral waters—containing the proper percentage of the various mineral salts—are prepared in bulk, when the desired degree of radio-activity is added by means of specially prepared brass cylinders, called "activators." The Radiological Institute, of Heidelberg University, stands sponsor for the claim that no considerable dissipation of the emanations occurs so long as the water is not agitated—otherwise, it loses its activity

very rapidly. This latter observation might be studied in connection with the stimulating effects of sea-air, sea-bathing, and the tonic effects of an ocean voyage, since both streams and mineral springs eventually discharge their contents into some of the large bodies of water, carrying with them more or less of the inorganic constituents of the soil through which they permeate, and probably radium among the number.

Physiologic Action.—Since radium has been employed in the treatment of numerous diseases experimentally without any definite idea of what it is expected to accomplish, and without a knowledge of its effect upon the living tissues, normal or diseased, a brief reference to its physiologic action will prove interesting and instructive.

According to Sir William Ramsay, there are three kinds of rays emanating from radium, "alpha," "beta," and "gamma." The first can be bottled, the alpha rays being due to a gas which cannot escape unless the stopper of the bottle is removed. The beta rays are also particles, but very small and moving with enormous velocity; the gamma rays are not particles, but mere waves in the ethereal medium which surrounds us—analogous to light. In answering the question, "How long would radium last if it were always changing into gas," Sir William replies, "Forever." The amount given off is always proportional to the amount of radium present. In addition, he says, "We can tell how long it will take radium to half-change into the emanations, and the time which we have just measured in the laboratory is 1750 years."

The classical researches of Rutherford throw additional light upon this topic. He says that the alpha rays consist of positively charged flying particles, these particles being of atomic dimensions, flying through the air at the rate of about twenty thousand miles per second (?). By means of the electrometer, he has succeeded in catching these particles one by one; in other words, he has captured and demonstrated the individual atom—at the rate of about thirty each minute.

The method by which these results were attained is referred to as "a most attractive study in ballistics." A firing chamber contains the radium and between this and the target chamber is placed an extremely thin mica plate. As the infinitesimal projectiles enter the detecting-chamber through the window, the electric equilibrium of the contained air is upset, which causes the electrometer needle connected with it to jump—there is a "needle-jump" on the entrance of each particle.

In conducting these researches there was developed an extremely significant, scientific fact, relating to radium emanations, namely, that these particles possess the peculiar property of increasing the electric conductivity of the air, and this, it will be unnecessary to remind the reader, affords an explanation of its value in the treatment of various diseases, such as gout, rheumatism, superficial tumors and various skin diseases. At the same time, this peculiar property will account for the great reputation which radium has attained in the treatment of obscure nervous affections which were really cases of magnesium infiltration, the tissues impregnated with magnesium deposits being practically insulated. Exposure to radium emanations immediately stimulates the cellular structures by augmenting the electric conductivity of the tissues, including nerve tissue. This explanation also accounts for the failure of radium in cases of deep-seated tumors, such as cancer, because the penetration of the emanations is not sufficient to produce the desired effect upon electric conductivity of the deep-seated structures. Like all other remedial measures, however, success or failure in the employment of radium, both internally and externally, hinges upon the precautions taken to insure the normal alkalescence of the body fluids and tissues, as otherwise but temporary benefit can be expected.

Atomic Nature of Radium.—The existence of alpha particles had previously been suspected. For example, on placing a small portion of radium before a screen of zinc sulphide—in the dark—scintillating stars of light, like a swarm of fire-flies, appeared on the screen, supposed to be

due to the impact of individual particles, and now Rutherford's investigations confirm the working hypothesis.

That alpha particles are atomic has also been proved by other scientists. Thus, Royds introduced into a vacuum a small glass tube containing radium, the glass being so thin as to permit emanations—in the form of alpha particles—with the result that after two days there appeared in the vacuous space between the electric terminals a delicate, phosphorescent light, shown by spectroscopic examination to be helium. It remained for Dewar, however, to determine the volume of helium (gas), produced by one gram of radium, and by means of Rutherford's counting method he arrived at the approximate number of atoms, or alpha particles, in a cubic centimeter¹ of helium under standard conditions—25,600,000,000,000,000,000, a number in remarkable accord with that long accepted by scientists as representing the ultimate chemic particles in a cubic centimeter of gas.

This slight digression relating to the atomic constituency of radium would be pardonable if it did nothing more than emphasize the vital importance of studying metabolism in the light of recent scientific investigation, but a special significance is attached to this discussion, since the atom is not the ultimate in nature. Instead of being simple in constitution, atoms are actually highly complex, electrically charged particles, containing negative as well as positive electricity, and from the present outlook, final decision awaits our efforts in outlining and plotting the domain of electricity itself. Not only the human body, but every substance whatsoever presumably consists of ultimate particles, still more infinitesimal than atoms, possessing peculiar, definite and demonstrable properties which enable us to claim for them both electric and chemic reactions. How, then, shall we reconcile the crude methods of treating disease in the infinitely delicate living structures with which we have to deal?

¹ A centimeter is approximately five-eighths of an inch.

A STUDY OF METABOLISM—CONTINUED.

Absorption and Excretion—The Digestive Apparatus—The Pancreatic Secretion—Final Stage in Absorption—Microbic Digestion—Acid Excess in Debility—Excretion by Various Routes—Excretion by the Pulmonary Apparatus—Vicarious Function—The Skin—A Case of Rheumatism—Secondary Assimilation—Purgatives Objectionable—Acid Excess and Innervation—Summary.

Absorption and Excretion.—The initial and final steps in metabolism are designated absorption and excretion, numerous physiologic and chemic changes taking place as a result of the various stimuli, coupled with the inherent or vegetative function of the cells. When normal reactions are present, nutrition is maintained, because assimilation and elimination complement each other, leaving no waste material to hinder or interfere with function. In other words, nutrition depends upon assimilation, primary and secondary, and any material chemic change sets up at once a derangement of function, since it introduces abnormal stimuli. This proposition will be more easily recognized and understood by a brief reference to the different organs directly concerned in the process.

The Digestive Apparatus.—The digestive apparatus includes the entire alimentary tract, digestion of starchy food-stuffs beginning with mastication. A meal of bread and milk passes through a rather complicated process before it is ready for assimilation. Thus the ptyalin of the saliva, an enzyme or unorganized ferment, converts the starch into maltose, this action continuing for some time after it enters the stomach. The hydrochloric acid, which is activated (stimulated), by the alkalinity of the salivary secretion, also has some action upon the starch, while the gluten of the bread is changed by pepsin into gluten peptone. The caseinogen—of the milk—is changed into casein by the rennin, and consecutively, the pepsin changes it into casein proteose and peptone. The albumin and globulin of the milk are also

changed into proteoses and peptones, while the heat of the organ is sufficient to melt the fats. In addition, the soluble salts—of both bread and milk—are dissolved, rendering them available for distribution and assimilation.

When food is taken into the stomach, both openings close, the stimulus produces involuntary, rhythmic, muscular contractions, together with the flow of gastric juice. At the end of an hour, under normal conditions, the pyloric orifice relaxes, permitting the more liquid chyme to pass into the duodenum, where it comes into contact with the bile and pancreatic juice as they flow from the common duct. Now begins an interesting physico-chemic adjustment; the acid chyme flows from the stomach at somewhat irregular intervals, due to reflex action upon the pyloric orifice, which closes until the alkaline bile and pancreatic juice have neutralized the chyme. This process is continued until chymification is completed, the stomach being emptied in the course of three or four hours. However, it is not unusual for portions of undigested (nitrogenous) food to pass into the duodenum, where it comes under the influence of the trypsin of the pancreatic secretion, which converts the proteids into proteoses and peptones, thus supplementing the action of pepsin—the latter changes proteids into proteoses and peptones in the presence of hydrochloric acid. In addition, the acid gastric juice destroys many micro-organisms swallowed with the food.

The Pancreatic Secretion.—The pancreatic secretion is a complex substance. As previously stated, the contained trypsin supplements the pepsin, producing proteolysis in an alkaline medium; it also changes caseinogen into casein; amylopsin changes starch into maltose, dextrose and dextrin; steapsin splits up fat into fatty acid and glycerin; invertin changes maltose into dextrose, and saccharose into equal parts of dextrose and levulose; succus entericus changes maltose into glucose, and saccharose into invert sugar; bile neutralizes the acid chyme, precipitating pepsin, saponifies fats, carries waste products from the liver, and increases peristalsis, thus regulating the bowels.

Originally regarded simply as a process of solution, absorption and distribution, digestion has developed extremely complex and complicated problems, covering as it does the interval between the introduction of inanimate substances and their conversion into living, organized protoplasm, possessing all the essential properties of life—nutrition, excretion, motility, reproduction and response to stimuli.

Final Stage in Absorption.—The final stage in absorption takes place in the small intestine—through the intestinal villi (tufts), peptones being changed during the passage to albumins and globulins. The carbohydrates, soluble salts and proteids enter the capillaries, then are carried by the portal vein to the liver, thence to the general circulation through the hepatic vein. Fats are taken up by the lacteals, carried to the receptaculum chyli, thence by way of the thoracic duct to the left subclavian vein—where the chyle enters the general circulation.

This study would be incomplete without referring briefly to certain recent investigations relating to the stimulation (activation), of the glands by a pro-digestive product called “secretin.” Just as butter, syrup or jelly on bread stimulates the flow of saliva, so the presence of food in the stomach stimulates the production of secretin at the pyloric extremity, which “activates” the peptic glands. The same is true of the intestinal secretion—succus entericus—and further, it has been learned that unless the entero-kinase of the intestine combines with the trypsinogen of the pancreas to produce trypsin, there is but weak action of this proteolytic ferment.

Microbic Digestion.—Microbic digestion should not be overlooked. Whether it is essential in man has not been definitely settled, but there is ample evidence showing its serious disadvantages when excessive—some recent writers even assert that intestinal bacteria are responsible, not only for permanent invalidism, but also for premature decay and death, claiming that longevity would be promoted by removal of the colon in childhood.

In studying this question we must bear in mind that bacteria are in a measure complementary to stomach and intestinal digestion, acting upon the nitrogenous food-stuffs (meats), in the lower part of the small intestine. Portions of undigested food do escape gastric action, and may also pass along the small intestine without being converted by a weak-acting trypsin, in which case microbic digestion may, and often does, prove invaluable. Under normal conditions as to chemic reactions, there is a well grounded belief that bacteria are mutually antagonistic, and clinical evidence points to this theory as a reliable working hypothesis, well marked cases of appendicitis in the incipient stage readily yielding to remedial agents exhibited for the purpose of neutralizing acid excess.

The latter observation brings forward a pressing demand for definite information relating to measures available for conserving the digestive apparatus. Following the ingestion of food, we have learned that the saliva should be alkaline or neutral in reaction, since acid saliva is abnormal and will interfere with the action of ptyalin upon starch. But acid salivary reaction is a local manifestation of constitutional deviation, a positive proof that intestinal digestion is delayed and impaired, the hyper-acid condition of the stomach being a more or less constant complaint—there is failure in oxidation and defective elimination.

Acid Excess in Debility.—Acid excess is a common and usual condition when the system is debilitated from any cause, and leads to various obscure phenomena, such as headache, malaise, neuralgia, neuritis, irregular bowel movements and insomnia, together with rheumatic twinges and occasionally attacks of mental depression, a long train of ills that may be promptly corrected and the normal condition incident to perfect metabolism restored.

Of course, this refers only to chronic ailments, but we meet with the same conditions in acute diseases, and it is therefore a matter of prime importance to determine daily any deviation from the physiologic equilibrium—by testing the saliva with blue litmus paper. Indeed, many physicians

are now so well convinced of the practical adaptation of this simple operation that they place greater dependence upon the salivary reaction than they do upon the temperature record.

The whole secret then, of treating disease successfully, lies in the proper management of the digestive function; hence, our efforts to establish a scientific basis of treatment which will prove universally satisfactory to both physician and patient.

Excretion by Various Routes.—Excretion takes place by various routes—the liver performs a double function—its cells are so specialized that it manufactures glycogen (animal starch), from the nutritive elements carried to it by the portal vein, and it also secretes and eliminates bile, together with such poisonous products as are brought to it in the blood stream. It is in fact the kitchen of the body and yet it possesses no power to neutralize excessive acidity. Like all other organs and tissues, when the alkalinity of the blood is diminished, its functional activity is impaired, one of the most common derangements being engorgement of the bile ducts (canals)—when the sufferer experiences a metallic, brassy or putrid taste in the mouth, indicating re-absorption of bile. The daily excretion of bile varies within normal limits from sixteen to twenty-four ounces, and when the flow is arrested from any cause, there follows decomposition in the intestine, and generally an increased flow of colorless urine. Persons subject to recurrent attacks of neuralgia soon learn to interpret this latter symptom as a sure sign of an approaching siege—and unfortunately, resort to purgatives, when an alkali is demanded.

The kidneys also perform a double function; they secrete urine and at the same time eliminate waste products, acting in the capacity of filters. The daily amount of urine secreted is approximately forty ounces, about two and a half pounds, and in addition to this, more than an ounce of solids (500 grains), in the form of urea, the greater nitrogenous waste—tissue decomposition. It is a crystallizable substance, neutral in reaction, and soluble in water—less soluble in

alcohol. Formed principally in the liver ($\frac{8}{9}$), and in the intestine ($\frac{1}{9}$), the output varies with the diet, a nitrogenous diet (meats), notably increasing the amount. On the other hand, a meat diet leads to acidity with diminished oxidation and defective liver function, so that uric acid is formed instead. The normal daily secretion of uric acid¹ ranges from seven to ten grains; with imperfect oxidation due to acid excess arising from a meat diet, the proportions of urea and uric acid may be reversed, resulting in uricemia (lithemia—uric acid in the blood), or uric acid diathesis—deposits of urates in and around the joints. Meat eaters are also liable to attacks of uremia—retention in the blood of urea—as a result of magnesium infiltration consecutive to acid excess.

Other solid constituents of the urine include the following: Sodium chloride (common salt), 180 grains; sulphates (sodium and potassium), 30 grains; phosphates (alkaline and earthy), 45 grains; hippuric acid, 7 grains, all told, a little over an ounce and a half, and besides, there are extractives and coloring matter—indican, urobilin and urochrome. In disease, various foreign substances appear—sugar (glucose), in diabetes mellitus (glycosuria), acetone and diacetic acid, in acidosis, albumin (albuminuria), in Bright's disease, bile in jaundice, and in certain forms or types of indigestion, indican in excess (indicanuria).

Excretion by the Pulmonary Apparatus.—Excretion by the pulmonary apparatus consists chiefly of carbon dioxide (carbonic acid), a product of disassimilation derived from the tissues and the blood, elimination being imperatively demanded as a condition of health. Atmospheric air charged with ten per cent. carbon dioxide is fatal to life,

¹ Uric acid, a product of disassimilation, is an exceedingly insoluble substance, generally in combination with soda or ammonia, principally as urate of soda, but union with the base is very feeble. Laboratory tests show that urates are readily decomposed—in the test-tube—by the addition of a very small quantity of almost any acid, but clinical observation has demonstrated the inutility of acids in this diathesis, diminishing the alkalinity of the blood and tending to aggravate the malady.

but nature, always conservative, has provided that the blood shall part with it in passing through the lungs more readily than with oxygen. However, defective oxidation leads to impairment of the respiratory function with accumulation of carbonic acid, physical depression and mental hebetude, a condition which readily yields to a suitable breathing exercise. The subject, lying flat on the back, with the clothing properly loosened, should take a moderately full inspiration and hold the breath for a reasonable time, but not long enough to cause discomfort. This simple operation, repeated for a period of five or ten minutes affords immediate relief, and will be found available to counteract or overcome exhaustion. It is based upon the well known law in physics that the diffusion of gases is in inverse proportion to their density.

Vicarious Function.—Vicarious function on the part of the lungs is not unusual. For example, acetonuria is indicated by a peculiar, fragrant odor of the breath; chronic constipation often produces an odor of feces; impairment of the kidney function is attended with urinous odor; volatile and resinous substances, such as alcohol, ether, sandal-wood, and other medicinal preparations likewise escape through the pulmonary apparatus.

The Skin.—The skin performs an important function as a heat-dissipating organ, and besides, the insensible perspiration and solids carried off amount to a pound or more in twenty-four hours. It also serves to protect the underlying tissues, especially the end-organs of the sensory nerves from extremes of temperature, and it is frequently the seat of serious disorders traceable to impairment of the digestive apparatus. Thus, a person suffering from psoriasis on taking a hot bath in a weak solution of magnesium sulphate experiences a most violent aggravation of all the symptoms, while a Nauheim bath—an alkaline solution containing sodium bicarbonate and calcium chloride—relieves the distressing symptoms and affords comparative comfort for twenty-four hours. Like the lungs, the skin also performs vicarious functions, the most important being the

elimination or excretion of any surplus acid in the system, as in the case of fever or other acute disorders. In all chronic ailments this is a recognized factor, and the routine treatment of the present day is concerned with the discovery of physiologic remedies—to arrest the excessive secretion and overcome the debility incident thereto, overlooking the fundamental fact that this is a vicarious function consecutive to constitutional deviation and readily amenable to chemic stimuli. In no instance is this proposition more satisfactorily and conclusively demonstrated than in the case of night-sweats. Further, should be mentioned in this connection the prolonged convalescence where night-sweats have developed as a complication, because the acid excess promotes or favors the factitious deposits in the tissues—tissue infiltration, actually magnesium infiltration.

A Case of Rheumatism.—A case of rheumatism which recently came under observation will serve to illustrate and emphasize the importance of studying the chemic problem in nutrition.

The patient, a farmer, forty years of age, was taken with inflammatory rheumatism in April, six months ago, and although under constant medical treatment, he is still unable to work. There is pain and stiffness of all joints, the fingers being so bad that he is unable to close his hands. A few days before the first visit he said he had tried to work but failed. He cut four shocks of corn (about an hour's work) in two hours, and was laid up for the remainder of the day.

The salivary reaction was acid, the acid reaction of the skin pronounced, and as a result of his constitutional deviation he suffered from shortness of breath, the pulse being 96 per minute—at least twenty beats above normal.

Treatment was instituted (on Sunday), with two distinct objects in view—(1) to neutralize acid excess, and (2) promote magnesium dissociation, and as a result, he went to work Tuesday afternoon—plowing out potatoes—and continued right along to the end of the week, feeling better able to work every day. At the second visit, a week later, shortness of breath

had disappeared, the pulse-rate was 72 per minute and normal, the pain had subsided and stiffness in the joints was rapidly improving—by reëstablishing the physiologic equilibrium upon a normal basis in respect to chemic reactions.

Secondary Assimilation.—Having now considered digestion, or primary assimilation, it will be in order to discuss secondary assimilation, the formation of the organized tissues of the body—from the nutritive elements carried to the liver through the portal vein, and directly to the blood through the thoracic duct. The first, as well as the dominant factor which demands attention, relates to the chemic status of the finished product—it is alkaline. Looking at metabolism, either as a physiologic or chemic problem, we must admit that alkalescence is a normal condition as regards nutrition, while acidity is essentially an end-product or waste, incident to the various changes taking place in the human economy. Excretion has to deal almost exclusively with the elimination of acid products, acid urine, about two and a half pounds daily, acid perspiration, a pound and a half, and although the bowel movements are alkaline, they are limited to half a pound (8 ounces), three-fourths being water. Thus, the solids carried off daily by the bowels amount to approximately two ounces, one-third being living and dead bacteria. Notwithstanding this disparity, it is an open secret that both laity and the medical profession employ laxatives and purgatives—because they do not understand, or cannot comprehend how chemic deviation interferes with secondary assimilation, leading to arrest of function and diminished secretion in the intestine, with consecutive constipation.

Purgatives Objectionable.—From whatever viewpoint the question is studied, it must be apparent that purgatives are objectionable, because they interfere with secondary assimilation—by irritating the delicate cellular structures of the intestinal tract, which is responsible for the integrity of the primary assimilation, by carrying off a considerable portion of the watery part of the blood containing valuable antiseptic properties, and at the same time, reducing its

relative alkalinity, and finally, by lessening the elimination of acid products by the skin and kidneys, and thereby hindering or interrupting normal tissue change in the various organs of the body.

This, however, is but a superficial view of the unscientific method in vogue, a relic of antiquated tradition. A critical study of its bearings leads to the conclusion that it not only tends to impairment of the digestive function with arrest of elimination—by the skin and kidneys—but also that it must seriously interfere with innervation as regards the heart, the brain, the pulmonary apparatus, and in fact, all the vital organs. Generally speaking, the above might be considered plausible, because of its apparently reasonable and logical deductions, and in the absence of clinical observation, we could assume that the evidence was sufficiently conclusive to establish a case, but we must determine more definitely how acid excess interferes with innervation—the function of the nervous system.

Acid Excess and Innervation.—This question is discussed more in detail elsewhere, but it will serve our present purpose to offer theoretic examples, deferring the concrete illustrations for presentation under their proper headings. Thus, acid excess interferes with innervation by or through definite or demonstrable chemic changes occurring in the nerve structures, inorganic substances being deposited which enact the rôle of insulators—when the nerve supply of the heart is involved, the organ is crippled by insulation rather than by the intangible modern theory of “nerve-strain.” Clinical observation points to a “short-circuit” of the electric current, by which the organ is insulated, and this is confirmed by postmortem examination, the heart muscle being found undergoing calcareous degeneration. Involvement of the brain structures furnishes even more convincing evidences, such patients usually being longer under observation, but in the final analysis the morbid condition is substantially the same, hardening of the tissues, defective innervation with magnesium infiltration as a result of long continued acid excess. There is no reasonable excuse

for such an unfortunate state of affairs—permitting this almost universal disassimilation to continue. In the light of the facts presented, the popular dictum that “a man is as old as his arteries,” must undergo revision, substituting therefor—a man’s age is in direct ratio with the intelligence of his doctor. It is simply a question in metabolism, dealing almost exclusively with the chemic problem in secondary assimilation, and it is pathetic, indeed pitiful, that a man should be old at the age of sixty.

Summary.—The deviations from normal have been so fully presented or reflected in the discussion on metabolism that it seems scarcely worth while to summarize, except for those who have no time to read the entire article, or merely for the purpose of refreshing the memory. It will be advisable, therefore, to attempt a condensation, with the special object of bringing forward more prominently the arguments and deductions best calculated to elucidate the idea implied by the title selected—the chemic problem in nutrition. Advantage is taken of the sub-headings in regular order to facilitate reference and economize time.

In defining the word metabolism, sufficient has been said to give a full and complete outline of its scope and significance from both the physiologic and chemic viewpoints. Analyzing the progressive changes between anabolism and katabolism, we are first confronted with the nature or character of the cause or causes which are either directly or indirectly concerned in their production—the normal nerve stimuli—electric, thermic, mechanic, chemic and psychic—particular care being given to the study of electric stimulus—because it produces thermic, mechanic, and chemic as well as psychic stimulus. Moreover, a new light is shed upon the therapeutics of medical treatment by means of the high frequency electric current, evidence being advanced to show that its remedial value is due largely to its influence in augmenting the conductivity of the body fluids and tissues—similar to the effect produced by radium emanations—a scientific fact which must prove of inestimable value to the clinician in the near future.

But little is said regarding the action of heat and cold, not because thermic stimulus is of secondary importance, but for the reason that heat and cold are factors in the treatment of disease not so intimately connected with the subject in hand—that is, variations in temperature are not dominant factors, rather incidental factors with which we have to contend in our efforts to ameliorate the disorders arising from chemic deviations. Thus, while it is true that a person suffering from neuralgia, neuritis, sciatica, or lumbago is likely to experience an elevation of temperature, it does not follow that he should be dosed with antipyretics, or subjected to the cold bath treatment. The first would but add insult to injury, and the second would simply prolong the misery—by arresting or impeding the normal chemic (molecular), activities of the body cells. Heat would afford temporary relief, partial or complete, but recovery would depend upon the vitality of the patient, meaning by that, his inherent ability to conquer the effect of an abnormal stimulus. Why not begin at the right end to unravel the tangled skein—by employing chemic antidotes?

Mechanic stimulus, as illustrated by osteo-therapy, has received impartial consideration, its demand for the correction of such deviations as may be classed in the category of deformities being readily admitted. Like other nerve stimuli, its employment is attended with the coincident development of other kinetic stimuli—chemic action, heat and electric stimulation, while the psychic effects deserve attention. Notwithstanding these commendable features, there are limitations, owing to the patent fact that many of the disorders for which it is recommended are clearly local manifestations of constitutional involvement—such as those previously mentioned—when osteo-therapy is merely palliative.

A note has been added relative to the untoward effects of abnormal stimulation, a constant and persistent factor in the treatment of disease, and unfortunately too often overlooked. Abnormal stimulation is the complication; without this, medical treatment would be reduced to a

mechanical basis, so that a carpenter, blacksmith, or a machinist could relieve and cure disease as well as the most learned member of the Faculty.

In this connection should be mentioned the long train of symptoms—and ailments—arising from the impairment of intestinal digestion as a result of acid excess, a notable and conspicuous example of abnormal stimulation, or inhibition.

Psychic stimulus is discussed with a view to develop its limitations, rather than for the purpose of discrediting its supporters—and mainly with a hope that the susceptible minority, with a broader horizon, may be able to secure a more intelligent conception of the morbid complexus known as disease. A brief reference to tropism will serve to emphasize this suggestion.

In studying the special manipulation of the various food products, as carried on through the different stages from absorption to excretion, an effort has been made to show how, through their purely vegetative functions, the cells complete their work under normal conditions as regards chemic reactions, indicating at the same time how deviations therefrom impede, hinder or subvert the normal cellular activities—as a consequence or result of defective innervation. And finally, discussing assimilation, it is pointed out as regards the finished product in digestion that it is constantly and entirely alkaline, alkalescence being the normal chemic status of the body fluids and tissues in anabolism, while acidity must be looked upon as essentially an end-product or waste.

Concluding this chapter, a word must be added in anticipation of criticism. The statements covering the scientific and clinical facts are such as to require no verification, since they are fundamental. Whatever is new relates to their interpretation; hence, it cannot be said with candor—"What is true is not new, and what is new is not true." The interpretations will bear critical investigation—indeed, the principles here laid down will, when recognized and applied, effect a revolution in the treatment of disease, diminishing sickness, insuring health, and promoting longevity.

INORGANIC FERMENTS.

Colloidal Solutions—Colloids Non-toxic—Oligo-dynamics—Surface Energy—Adaptability of Mineral Ferments—Analogous to Organic Ferments—Bredig's Impressions—Poisons Affecting Colloidal Solutions—Clinical and Scientific Facts—Influence of Tradition.

Colloidal Solutions.—We are indebted to Bredig for the introduction of inorganic ferments, colloidal solutions of metals, which possess catalytic properties, acting as ferments.

As contrasted with natural colloids, such as starch, gum, gelatin, albumin, glycogen, etc.—mineral ferments are usually prepared by electrolysis, the metal being held in suspension in the form of ultra-microscopic particles. However, hydrates, sulphides and certain metals become colloidal by the operation of chemic processes, the well known antiseptic action of copper or copper-lined vessels furnishing at once an illustration and a demonstration.

The peculiar and special value of artificial ferments—from a clinical viewpoint—appears to be rather imperfectly understood. For example, recent literature advocates the employment of electric colloidal solutions of metals in the treatment of various diseases on the ground that they show an “incontestible superiority” over chemic colloids, the claim being advanced that the former are bactericidal and non-poisonous.

Taking copper as an illustration of this peculiarity, the experiments of Galeotti are particularly interesting. Thus, Galeotti (quoted by Kearney and Cameron), has shown (*Biol. Centralbl.*, 21, 239, 1901):

“The oligo-dynamic action of relatively concentrated ‘colloidal’ solutions of metals disappears in the presence of weak solutions of electrolytes. A solution of copper containing 1 gram atom of metal per 126,000 liters of water produces no effect upon spirogyra in the presence of 0.01 per cent. solution

of sodium chloride, and a solution of 1 gram atom of copper per 63,000 liters of water acted only after twenty-four hours, although in the absence of the electrolyte the toxic effect of the colloidal copper solution is manifested at the dilution of 1 gram atom of copper per 126,000,000 liters of water."

Colloids Non-toxic.—In other words, the ordinary, non-electric or oligo-dynamic action of copper solutions is at least two thousand times more toxic to algæ than the electrolytic solution of the same metal. Nageli's classical discussion of the toxic effects of exceedingly dilute solutions of metallic salts upon the alga *spirogyra* is most interesting and suggestive. Thus, he found that copper (sulphate), in the solution of one part to 1,000,000,000 was fatal—and from these investigations, confirmed by numerous other authorities (Deherain and Demoussy, H. Devaux, Miani, Israel, and Klingmann), there developed the employment of this salt for the purification of the water supplies of towns and cities, rendered offensive by the decaying organic matter.

Substantially, the same applies in the case of all metals, but at this point we run afoul of serious obstacles, as viewed by the medical practitioner, inasmuch as it is claimed that electrolytic solutions are not only non-toxic; but also that they possess bactericidal properties of great utility, apparently a contradiction of terms. In addition, however, the claim is advanced that these new candidates for professional favor are notably effective in stimulating the nutritive or vegetative functions—and further, that the various metals may be used indiscriminately.

Colloidal solutions of silver have been in the hands of the profession for several years past and have attained popularity with both surgeons and medical practitioners, and the fact that we are promised further additions to the list—gold, platinum, arsenic, palladium and vanadium—is sufficient to warrant a preliminary inquiry as to their properties, together with their prospective utility in practical medicine.

Oligo-dynamics.—In considering the basic principles involved, therefore, we must study carefully both the chemic and physiologic bearings, endeavoring as far as possible to reconcile and harmonize the various claims and deductions, to the end that electric colloidal solutions may be employed intelligently in the treatment of disease—an assumption which at once admits their practicability as well as their utility. Clinical observation coupled with experimental research and a critical study of the literature on the subject which has appeared within the last ten years, enables me to discuss the question impartially and without bias, although my teachings hitherto have been disregarded—perhaps on the ground that they were merely viewed as theoretical deductions rather than clinical and scientific facts.

The *oligo-dynamic action*—of drugs or remedies—has to deal with the effects observed from their employment or exhibition in small doses. From the preceding quotations, it will be readily apparent that ordinary chemic solutions, or colloids arising from ordinary chemic processes, are more actively poisonous to organic life than electric colloidal solutions of the same metal—in the case of copper (sulphate), it may be a million times more toxic. This statement will, at first glance, appear utterly incredible, but the most incredible thing about it is the fact—it is true. And this brings forward a new and novel conception of the oligo-dynamic action of drugs. For example, by means of electrolysis, metals are resolved into infinitesimal particles, called ions, anions being given off at the positive, kations at the negative pole, these particles being indistinguishable by the most powerful microscope.

Thus, metals in the form of electrolytic solution present an immense contact surface, a single cubic centimeter of colloidal gold being estimated to contain particles having a surface contact approximately 6,450 square feet. Moreover, while electrolytic solutions are heterogeneous, as contrasted with natural colloids, which are homogeneous, they possess the same peculiar characteristic, in not passing by dialysis through animal membrane. In addition, these colloidal

solutions have a catalytic action, analogous to the catalyzing action of similar solutions upon hydrogen superoxide.

Surface Energy.—Increased contact surface means increased surface energy, an augmentation of the osmotic properties of cells; in other words, the oligo-dynamic properties of the infinitesimal particles lead to increased motion, greater cellular activity, and in the absence of a tendency to hemolysis or plasmolysis, molecular changes are more rapidly accomplished—always provided, however, that the normal alkalescence of the body fluids and tissues is maintained. The effect of electrolytic colloids is, therefore, essentially that of stimulation, but without attention to the physiologic equilibrium there is no permanent advantage to be gained.

Thus, while beef-tea is recognized chiefly as a stimulant and without appreciable nutritive properties, its administration is followed by distinct osmotic action—a compensating current is established *into* the stomach, and *from* the intestine—due to the fact that it possesses a surface energy equivalent to about three atmospheres. However, we must not overlook the laboratory demonstration of Loeb, to the effect that “stimulation” of the living tissues tends to the production of alkalescence, but it must be evident to the most casual reader that stimulation in the case of diabetes must be continued indefinitely to overcome a 30 to 50 per cent. diminished alkalinity of the blood.

Again, it will be claimed that the normal saline is all-sufficient to correct this particular deviation, but in view of the fact that the bacillus tuberculosis will live for three months and the bacillus of typhus survives for six months in a saturated solution of sodium chloride, hypodermoclysis seems but a shifty expedient. Briefly stated, the neglect of means or measures to restore and maintain an approximately normal alkalinity of the body fluids is the submerged rock that has foundered every fair craft which has ever set sail upon the uncharted sea of therapeutics, and in the case of inorganic ferments, unless due precautions are taken, history will repeat itself.

Adaptability of Mineral Ferments.—Granted that metals in electrolytic solution, as colloids, possess the notable and peculiar properties claimed for them, bactericidal, non-toxic and stimulant, the question naturally arises as to the probability or possibility of their general adoption. Does the preparation of mineral ferments involve such delicate laboratory manipulation that their expense puts them beyond the reach of a physician in general practice? Or, does the employment of inorganic colloids demand such technical skill on the part of the operator that only specialists can safely adjust and determine their potency and potentialities.

In replying to these inquiries, while it is a travesty upon scientific medicine, physicians have from time immemorial enjoyed (?) these notable, peculiar and special advantages—except when they administered crude drugs in massive doses—and the explanation is so complete and satisfactory, so pat, I am almost ashamed to make the explanation.

The *denouement* is easily traced and well illustrated by the gradual changes which have taken place in methods of medication within the past quarter of a century, decoctions and draughts giving place to concentrated solutions of definite strength, more palatable and less unsightly, then the coated pill or tablet, and finally, the tablet triturate, the *ne plus ultra* in modern therapeutics. Given, an insoluble substance such as calomel, the biniodide of mercury or copper arsenite in the form of a tablet triturate prepared according to the directions of Dr. Robert M. Fuller, and the question is immediately answered, because the infinitesimal particles are suspended in the electrically charged body fluids as a heterogeneous colloid, and possess the peculiar properties characteristic of these ferments, bactericidal, non-toxic, and stimulant, since they exert osmotic pressure in consequence of their surface energy—and thus augment nutrition. The bactericidal properties of electric colloids, whether used hypodermically or given internally in the form of triturates, are indirect rather than direct, due to their favorable modification of the vegetative functions

by osmotic pressure and the coincident stimulation arising therefrom, so that success or failure will hinge upon our efforts to restore and maintain the normal alkalinity of the blood.

Analogous to Organic Ferments.—The discussion of inorganic ferments would be incomplete without reference to the striking analogy between them and organic ferments, more especially in respect to the poisonous effects of various substances which are used medicinally, or such waste or decomposition products as may develop in the human body during an attack of illness. Thus, an infinitesimal portion of hydrocyanic acid will perceptibly reduce the action of colloidal platinum upon hydrogen superoxide, while a gram-molecular weight (15 grains), of hydrogen sulphide gas dissolved in 34,500 liters (quarts) of water, reduces the velocity of the action to nearly zero. Substantially the same is true of carbon disulphide and corrosive sublimate—both of which, when in sufficient quantity, entirely prevent the action.

The importance of the investigations will be apparent when it is taken into consideration that these different substances are used medicinally, notably hydrogen sulphide and corrosive sublimate; hence, the expected benefits from colloidal solutions are impossible of realization. In addition, should be noted the fact that the substances mentioned are equally poisonous to organic ferments, and as a consequence their medicinal administration in crude form or in large dosage, is calculated to defeat the purpose for which they are employed—and this is, unfortunately, too often the case. There is, indeed, a woeful lack of provision regarding the necessity for conservation of the organic ferments in the treatment of disease, so that when a patient recovers—in spite of treatment (?)—his tissues are bankrupt and convalescence unduly prolonged.

The outlook, however, is not altogether unfavorable, since these colloidal solutions are extremely simple, while organic ferments on the contrary are very complex, so that by studying the *modus operandi* of the inorganic ferments,

we may arrive at more definite conclusions relative to the physiologic functions and chemic properties of the enzymes or unorganized ferments of the digestive apparatus.

In comparing the action of poisons upon both organic and inorganic ferments, we have brought forward their most striking analogy, but as a preliminary, we have other evidences of similarity, as follows:¹

1. Very small amount of a colloidal metal will effect the decomposition of enormous quantities of hydrogen superoxide, just as very small amounts of organic ferments can effect relatively large transformations.

2. These finely divided metals do not enter into the reaction they effect, but by reason of their surface contact, which determines their chemic status as catalyzers, such reactions being termed catalytic—mono-molecular. Precisely the same is true of the enzymes—they do not enter into the reaction, the action being due to the surface contact, thus introducing into medical practice a comparatively new term, surface energy, first brought forward by Bredig in his classical study of the mineral ferments. The following quotations from his monograph will serve to indicate his sincerity, while at the same time, it displays his marvelous enthusiasm:

Bredig's Impressions.—All these facts point to an unmistakable analogy between the contact actions in the inorganic world, and the actions of ferments in the organic world. As in the case of my colloidal catalyzers, we are dealing with reactions in which enormously developed surfaces are involved, so it is probable that the same condition obtains in the action of ferments, enzymes, blood corpuscles and oxidizing or catalyzing organic substances. We see, therefore, that the organism develops its enormous surfaces in the tissues and colloidal ferments, not only because it requires osmotic pressure, but on account of the very great catalytic activity of such surfaces. If, as Boltzmann says, the war for existence which living matter must wage is a war about free energy, certainly, of all the forms

¹ Jones, Johns Hopkins Hospital Bulletin, May, 1902, p. 97.

of free energy, the free energy of surface is the most important for the organism.

In conclusion, I need scarcely state that I do not maintain that there is any mysterious identity between the metals and the enzymes. But without exaggeration, the overwhelmingly large number of analogies, we are compelled to regard the colloidal solutions of the metals, in many relations at least, as inorganic models of the organic enzymes.

Poisons Affecting Colloidal Solutions.—In reviewing Bredig's work, Professor Jones¹ publishes a number of laboratory records showing in a most graphic manner how various poisons affect colloidal solutions of platinum, among the number being hydrocyanic acid, cyanogen, iodide and iodine, the latter being the most active of all those tested.

In fact, there is no recovery of the chemic action after exposure to the iodine solution, and this it may be remarked is in harmony with our clinical knowledge of iodine, which has long been recognized as an intense blood poison. Employed as an "alterative" in the treatment of many disorders, particularly syphilis and chronic diseases, for the avowed purpose of affecting resolution of morbid growths and hardening of the tissues, by promoting absorption, much harm has attended its injudicious use, in consequence of its poisonous effect upon animal tissue. However, its value must be conceded; hence, the need for some available plan to counteract or overcome this objection, a topic carefully considered in the section devoted to disorders of the circulation.

Clinical and Scientific Facts.—An editorial with this heading, and referring to my paper ("Inorganic Ferments"), appeared in the *Medical Times* (New York, August, 1910), as follows.

"That medical progress has long been hindered—seriously handicapped and frequently deviated from its legitimate

¹ Loc. cit.

course—by tradition—is a truth firmly impressed upon the minds of all who endeavor to develop the scientific principles of drug therapy. Thus, certain remedies have long enjoyed great popularity in the treatment of disease, simply because of a claim that they were ‘good’ for this or that, but without any attempt to define or explain their properties on a physiologic basis. In many instances, later investigations have brought forward certain fundamental facts relating to physiologic action, which not only justify their employment, but these researches enabled the physician to employ the traditional remedies with discrimination and greater benefits to the patient. Nevertheless, the clinical fact, somewhat befogged and hazy, preceded the scientific fact, clear and distinct, which appeared in its stead. Indeed, *strophanthus* (arrow-poison), introduced by Fraser, of Edinburgh, was the first Galenic brought to the attention of the profession through strictly scientific induction—and since that time we have the antitoxins.

“The foregoing remarks are suggested as a result of studying the possibilities and estimating the probabilities of a further study of ‘Inorganic Ferments,’ as outlined in the suggestive paper on this topic which appeared in our July number. In marked contrast with the crude methods in vogue at the present day, the advantages of employing metals in the form of non-toxic colloids introduces a new factor into modern therapeutics which gives promise of leading to efficiency and simplicity, while at the same time, it presents a most fascinating field for the clinician, inasmuch as it deals with the delicate function of the cells.

“However, in considering this promising outlook, we cannot resist the temptation to recall the old maxim that ‘history repeats itself,’ the introduction of inorganic ferments being merely a scientific adaptation of the claims advanced by Samuel Hahnemann more than a hundred years ago. Although Hippocrates, Galen, Paracelsus, and other ancient physicians were kindly disposed to the doctrine of *Similars*, they were not the originators of any system of medicine. Unfortunately, Samuel Hahnemann made the serious mistake of claiming that trituration and succussion gave the remedies spiritual properties

—due of course, to absence of scientific knowledge and lack of instruments of precision. It was impossible for him to understand, as we do at the present time, that trituration and succussion have the effect of presenting medicinal substances in such a finely divided form that when taken up by the body fluids, they become non-toxic colloids, with immense surface contact and, therefore, increased surface energy—to influence osmosis.

“In other words, Hahnemann had a somewhat indefinite idea of oligo-dynamics coupled with prevision, or shall we say prophetic vision, to discover and outline certain peculiar and unmistakable properties of remedial agents when introduced into the system in this special form, in marked contrast with the effects following the administration of crude drugs?”

Influence of Tradition.—As further showing the influence of tradition may be mentioned the fact that the doctrine of signatures and also that of isopathy have been relegated to innocuous desuetude, being supplanted by organo-therapy and antitoxins, while Hering's psorine theory has given place to bacterins, so that today the medical profession occupies as it were the twilight zone or border-land between crude medication and scientific therapy.

Nearly twenty years ago, the writer had some very interesting correspondence with the late Dr. Egbert Guernsey, who wrote in regard to my teachings on the subject of cellular therapy, asking if I was not likely to arrive at the same conclusions as Hahnemann, proceeding by a different route. I replied to the effect that I did not think so, because my studies were conducted with a view to determine the selective action of remedies upon the cellular structures, while Hahnemann's object appeared to be for the purpose of determining the effect of remedies upon the body as an entity.

THE FOOD PROBLEM, WITH DIETARY STUDIES.

A NEW FACTOR IN DISEASE—A Question in Dietetics—Magnesia in Excess—Ash Constituents of Food Materials (Tabulation).

DIETARY STUDIES—Teacher's Family, Indiana—Mill Workman's Family, Pittsburg—Negro Farmer's Family, Alabama.

MECHANISM OF THE NERVOUS SYSTEM—Chorea (St. Vitus' Dance)—Infantile Paralysis—Insomnia—Mucous Catarrh and Skin Diseases.

THE CHEMIC PROBLEM—Assimilation, Primary and Secondary—Magnesium Infiltration—Nature of Magnesia Deposits.

INJURIOUS EFFECTS OF MAGNESIUM ON PLANT LIFE (illustrated)—Electrolytes from Plant Growth—Regulating Medication—Ash Constituents Required Daily (Tabulation).

PELLAGRA—A Disorder of Nutrition—Normal Acidity of Corn Meal—Chemic Constituents of Corn—Deficiency of Lime and its Effects.

A NEW FACTOR IN DISEASE.

Within recent years marked changes have taken place in all lines of human endeavor—largely due to the careful study and observation of a comparatively limited number of persistent toilers in various fields. Notwithstanding the vast accumulation of scientific facts, the value of which is unquestioned, there is a notable dearth of information relating to adaptability, so that many discoveries of far-reaching significance lie dormant for years. This unfortunate state of affairs is usual, or shall we say, common, owing to the fact that scientific attainments and utilitarian proclivities do not go hand in hand. The scientist is concerned alone with a demonstration in the abstract; the concrete evidence is adduced to support the abstract theories, when his work is finished. We have now reached a period in modern civilization, however, when utilitarianism has taken an advanced position, when the scientific aspect of a discovery or an invention is studied with a view

to determine its adaptability from a commercial or an humanitarian standpoint, both being regarded as of paramount importance by the political economist. And this brings us to the subject in hand, a new factor in disease.

To the layman, such announcements are of almost daily occurrence; moreover, he is not personally interested, unless he chances to be under medical treatment, in which case he will want to know whether or not it has any reference to his particular ailment—so that he may consult his medical attendant. The ordinary physician having been deluged with literature upon abstruse topics relating to bacteriology, far too scientific for his comprehension, will give little heed to inquiries, believing or assuming that science has finally reached the limit. Specialists, more enterprising, are quick to investigate innovations which have a direct bearing upon their specialty, but they must be thoroughly convinced of adaptability.

Such being the outlook, the task of developing the fundamental basis of this new factor in disease appears herculean. Still, the difficulties are not insuperable—the most serious obstacle being the fact that the deviation from normal has hitherto escaped attention at the hands of the general practitioner as well as the specialist and experimental investigator. It is not only difficult to swerve from the beaten track—of tradition—but it is even more serious to admit error. To rectify an oversight which has passed unobserved for generations requires not only moral courage on the part of the claimant; he must also be prepared to submit the indisputable evidence in proof of his contention—and this, the writer feels amply qualified to produce, *in extenso*.

A Question in Dietetics.—This new factor in disease is in reality a question in dietetics and its presence as well as its persistence is susceptible of proof by the ordinary methods familiar to physiologic chemists. In fact, it has to deal almost exclusively with the deviations incident to the chemistry of digestion. Thus, it trenches upon human welfare, touching all points of the compass—in short, it

appeals to the individual, both young and old, male and female alike, because a knowledge of its presence makes for health as well as longevity. How many sufferers from indigestion with its attendant train of sequelæ would be glad to know why and how it was brought about? To afford the general reader a reliable and accurate method for determining the true cause for his illness would appear utopian, and yet it is accomplished by means of a very simple test—an evidence of adaptability. Applying the terms used by modern advocates of "System," in the domain of commerce, this "adaptability" might be regarded as an illustration of scientific efficiency in therapeutics.

Magnesia in Excess.—Magnesia in excess is the factor responsible for the indigestions and also for most of the prevalent chronic ailments, whether organic or functional. In addition, it should be added that magnesia in excess develops coincident with the progress of acute diseases, and accounts for prolonged convalescence. In many instances we are even able to trace susceptibility directly to this abnormal condition, so that early recognition of this particular deviation from normal becomes a matter of prime importance to those apparently in robust health. To the afflicted and semi-invalid this discovery might be the means of enabling them to regain health and happiness, because it makes for simplicity and efficiency. The practical value of these suggestions is perhaps more forcibly brought forward in the accompanying tabulation, since it enables the reader to understand and appreciate the disadvantages arising from an unsuitable dietary—in other words, it shows how the milk gets into the cocoanut. In this tabulation I have included a fairly complete list of dietary articles—animal foods, cereals, vegetables, fruits, etc.—making up the usual diet of adults and children, the estimated "ash constituents" being taken from the comprehensive monograph, *Calcium, Magnesium and Phosphorus in Food and Nutrition* (1910), prepared by Sherman, Mettler, and Sinclair, Department of Chemistry, Columbia University (New York).

ASH CONSTITUENTS OF FOOD MATERIALS—ESTIMATED.

Food Materials. Animal Foods, Cereals, etc.	Per cent. Calcium oxide.	Per cent. Magnesium oxide.	Surplus proportions: Calcium oxide to magnesium oxide.
Meats (per 100 grams protein)	(0.076)	(0.190)	1.00 to 2.50
Fish and shellfish (per 100 grams protein)	(0.180)	(0.230)	1.00 to 1.27
Eggs	0.100	0.015	6.66 to 1.00
Butter (and butterine)	.022	.001	22.00 to 1.00
Buttermilk (estimated as milk)	.172	.018	9.55 to 1.00
Cheese	1.240	.049	25.30 to 1.00
Cottage cheese	.100	.015	6.66 to 1.00
Milk, whole	.172	.018	9.55 to 1.00
Cream	.147	.015	9.80 to 1.00
Barley, pearled	.025	.100	1.00 to 4.00
Corn meal	.009	.132	1.00 to 14.66
Hominy (as old process meal)	.014	.196	1.00 to 14.00
Oatmeal (including rolled oats, etc.)	.078	.249	1.00 to 3.19
Rice	.012	.060	1.00 to 5.00
Wheat flour (crackers and maca- roni)	.028	.026	1.07 to 1.00
Graham flour and entire wheat flour (assumed)	.037	.150	1.00 to 4.05
Flaked wheat breakfast food	.043	.239	1.00 to 5.55
Bread	.021	.019	1.10 to 1.00
Chocolate	.141	.483	1.00 to 3.42
Molasses	.355	.176	2.01 to 1.00
Maple syrup	.123	.100	1.23 to 1.00
Honey	.005	.030	1.00 to 6.00
Vegetables.			
Asparagus	.038	.017	2.23 to 1.00
Beans, pea, dried	.215	.252	1.00 to 1.17
Beans, kidney, dried	.226	.261	1.00 to 1.15
Beans, lima, dried	.106	.311	1.00 to 2.93
Beans, string, fresh	.073	.050	1.46 to 1.00
Beets	.019	.029	1.00 to 1.52
Cabbage	.058	.021	2.76 to 1.00
Carrots	.077	.032	2.50 to 1.00
Celery	.094	.027	3.38 to 1.00
Corn, canned or green	.045	.070	1.00 to 1.55
Cucumbers	.028	.018	1.55 to 1.00
Eggplant	.017	.037	1.00 to 2.17
Greens, turnip-tops	.508	.036	14.11 to 1.00
Greens, soup greens (assumed)	.080	.030	2.66 to 1.00
Horseradish	.136	.038	3.57 to 1.00
Lettuce	.045	.012	3.75 to 1.00
Onions	.040	.015	2.66 to 1.00
Parsnips	.076	.044	1.72 to 1.00
Peas, dried	.137	.204	1.00 to 1.48

	Per cent. Calcium oxide.	Per cent. Magnesium oxide.	Surplus proportions: Calcium oxide to magnesium oxide.
Vegetables.			
Peas, canned	.023	.034	1.00 to 1.47
Potatoes	.016	.040	1.00 to 2.50
Potatoes, sweet	.025	.019	1.31 to 1.00
Pumpkins	.032	.014	2.28 to 1.00
Radishes	.025	.019	1.31 to 1.00
Rhubarb	.060	.010	6.00 to 1.00
Rutabagas	.103	.031	3.32 to 1.00
Spinach	.064	.053	1.20 to 1.00
Tomatoes	.019	.016	1.18 to 1.00
Tomatoes, canned	.019	.016	1.18 to 1.00
Turnips	.087	.029	3.00 to 1.00
Vegetable soup (canned, con- densed)	.026	.021	1.23 to 1.00
Watercress	.259	.046	5.63 to 1.00
Fruits.			
Apples	.011	.014	1.00 to 1.27
Apples, evaporated	.037	.054	1.00 to 1.45
Apricots	.021	.019	1.10 to 1.00
Bananas	.009	.035	1.00 to 3.55
Blackberries	.079	.037	2.13 to 1.00
Blueberries	.045	.015	3.00 to 1.00
Cherries	.026	.027	1.00 to 1.03
Cranberries	.021	.012	1.75 to 1.00
Currants	.046	.026	1.76 to 1.00
Currants, dried	.169	.076	2.22 to 1.00
Figs, dried	.280	.144	1.94 to 1.00
Grapes	.014	.019	1.00 to 1.35
Grape jelly	.009	.015	1.00 to 1.66
Grape fruit	.029	.015	1.93 to 1.00
Huckleberries	.037	.027	1.37 to 1.00
Oranges	.043	.016	2.68 to 1.00
Peaches, dried	.048	.093	1.00 to 1.93
Peaches	.015	.015	1.00 to 1.00
Pears	.018	.014	1.28 to 1.00
Pears, canned	.008	.007	1.14 to 1.00
Pineapples	.038	.027	1.40 to 1.00
Plums	.022	.019	1.15 to 1.00
Plums, jam, canned	.014	.012	1.16 to 1.00
Prunes	.063	.084	1.00 to 1.33
Raisins	.042	.070	1.00 to 1.66
Raspberries	.072	.037	1.93 to 1.00
Strawberries	.057	.036	1.58 to 1.00
Watermelons	.018	.022	1.00 to 1.22
Miscellaneous.			
Pie, apple (assumed)	.030	.030	1.00 to 1.00
Pie, cream (assumed)	.040	.030	1.33 to 1.00
Pie, custard (assumed)	.060	.030	2.00 to 1.00
Pie, mince	.044	.037	1.18 to 1.00
Pie, squash	.030	.015	2.00 to 1.00

While it would be unwise to draw any sweeping deductions from the foregoing tabulation, it must be evident to even the casual observer that both adults and children may receive too large a percentage of magnesia from the food taken, in which case there is a dislike for certain foods, showing that they fail to receive a properly "balanced ration." How unfortunate, then, when parents insist upon children eating certain foods, despite their protest when, as a matter of fact, the child's stomach affords a more reliable criterion—in respect to calcium and magnesium—than can be obtained by the most painstaking laboratory studies; but the demands of the stomach must be properly interpreted to insure perfect nutrition and symmetrical development. This rule applies with equal force in the case of adults. With a reasonable degree of care, the demand of the stomach is a fairly reliable guide, always bearing in mind that the form is far more important than the substance in dietetics. Thus, a child suffering from excess of magnesia, will refuse corn meal, graham bread, flaked wheat and honey, while readily eating oatmeal, plain bread and molasses or maple syrup, because of the lower percentage of magnesia in the latter combination. Again, the same child, if given bread and butter, will quietly skim off the butter, leaving the bread, because there is a craving for the calcium content of the butter, twenty-two times as much calcium as magnesia. Let the bread be saturated with molasses or syrup and it quickly disappears, owing to the demand for readily oxidizable substances to produce heat—a scientific fact which accounts for the almost universal craving for candy and sweets on the part of children and adolescents. Still, it should be noted that such food-stuffs differ materially from what might be termed the substantials, such as eggs, milk, and cream, which contain from six to ten times as much calcium as magnesia, this adaptability being more fully developed in the accompanying tabulations.

DIETARY STUDIES.

In this connection, it will be worth while to reproduce certain "Dietary Studies" included in the monograph referred to—as a means of showing the relative proportions of calcium and magnesia ingested with food under different conditions in respect to occupation and environment. They must be accepted as presenting "careful estimates of the actual amounts consumed by typical people living under normal conditions and with freely chosen food."

Dietary Study of a Teacher's Family, Indiana.—"This study was made in March, 1895, and continued fourteen days. The family consisted of four men and two women. One of the men was a professor of mathematics, one an instructor in chemistry, the other two were college students. The younger woman was also a teacher. The total food consumed was equivalent to that of one man for seventy-eight days. The food eaten furnished 106 grams of protein, and 2,780 calories, at a cost of 18 cents per man per day.

"The table below shows the amounts and kinds of food used, together with the estimated amounts of lime and magnesia . . . furnished by each and by the diet as a whole."

Attention should be directed to the relative proportions of lime (calcium), and magnesia supplied by the various foods. Thus, of the food eaten, 111.132 grams, the bulk, 99.399 grams, came from eggs and milk, while the magnesia content was derived principally from meats, milk, corn meal, flour and crackers, beans and potatoes, the proportion of lime to magnesia being approximately $3\frac{1}{2}$ to 1.

ESTIMATED ASH CONSTITUENTS IN DIETARY STUDY No. 44.

Food Materials and Weight of Edible Portion.	Calcium oxide. Grams.	Magnesium oxide. Grams.
Meats: Beef, veal, pork and lamb (total meat protein 3,413 grams)	2.593	6.484
Eggs, 4,705 grams	4.705	.705
Butter, 1,785 grams	.392	.017
Milk, 55,055 grams	94.694	9.909
Mince-meat, 370 grams	.162	.136
Corn meal, 2,395 grams	.215	3.161
Hominy, 255 grams (as old process corn meal)	.033	.499
Flour and crackers, 14,625 grams	4.095	3.802
Oatmeal, 240 grams	.187	.597
Sugar, 6,605 grams		
Maple syrup, 895 grams	1.100	.895
Honey, 425 grams	.021	.127
Beans, dried, 835 grams	1.795	2.104
Cabbage, 2,890 grams	1.676	.606
Corn, canned, 1,210 grams	.544	.847
Lettuce, 905 grams	.407	.108
Parsnips, 795 grams	.604	.349
Potatoes, 6,750 grams	1.080	2.700
Radishes, 310 grams	.077	.058
Apples, 5,470 grams	.601	.765
Bananas, 1,420 grams	.127	.497
Cranberries, 355 grams	.074	.042
Oranges, 540 grams	.232	.086
Peaches, dried, 865 grams	.415	.804
Prunes, dried, 865 grams	.277	.369
Raisins, 45 grams	.018	.031
In total food	116.124	35.698
In waste (4.3 per cent.)	4.992	1.535
In food eaten	111.132	34.163
Per man per day	1.42	.44

Dietary Study of a Mill Workman's Family, Pittsburg.—"This study was begun in January, 1896, and continued twenty-nine days. The family consisted of two men, two women, and five children, aged respectively, thirteen, ten, seven and fourteen years, and 7 months. The family was in very poor circumstances. The total number of meals taken was calculated by the usual factors as equivalent to the meals of one man for 174 days. The food furnished one man per day was 77 grams protein and 2,440 calories, at a cost of 8.7 cents.

"The table following shows the kinds and amounts of food

used, together with the estimated amounts of lime and magnesia
 . . . furnished by each and by the diet as a whole."

ESTIMATED ASH CONSTITUENTS IN DIETARY STUDY NO. 129

Food Materials Used.	Calcium oxide. Grams.	Magnesium oxide. Grams.
Meat: Beef and pork (total meat protein, 5,350 grams)	4.066	10.165
Oysters (protein, 32 grams)	.057	.073
Butterine, 3,910 grams (as butter)	.860	.039
Cheese, 1,860 grams	23.064	.911
Milk, 14,745 grams	25.361	2.654
Flour, 9,810 grams	2.746	2.550
Oatmeal, 285 grams	.222	.709
Bread, cake, and rolls, 52,075 grams		
Pie, 3,720 grams		
Sugar, 10,455		
Beans, dried, 580 grams	1.247	1.461
Beans, dried, lima, 1,330 grams	1.409	4.136
Cabbage, 4,590 grams	2.662	.963
Carrots, 670 grams	.515	.214
Celery, 200 grams	.188	.054
Onions, 3,445 grams	1.378	.516
Parsnips, 655 grams	.497	.288
Potatoes, 21,215 grams	3.394	8.086
Watercress, 115 grams	.297	.052
Rutabagas, 2,180 grams	1.264	.457
Apples, 1,715 grams	.188	.240
Apple jelly, 365 grams	.025	.032
In total food	69.440	33.600
In waste (0.6 per cent.)	.416	.201
In food eaten	69.024	33.399
Per man per day	.396	.192

In this instance, it will be observed that the lime content was derived principally from cheese, milk, flour, cabbage and potatoes, amounting in all to 57.227 grams. Magnesia came from meats, milk, flour, beans and potatoes, in all, 27.591 grams, with a ratio of 2 parts lime to 1 part magnesia, but the actual cost was less than half that of study No. 44.

Dietary Study of a Negro Farmer's Family, Alabama.—"This study was made in January, 1896. The family consisted of a man and wife, and five children, the eldest of whom was

eleven years old; total consumption of food being equivalent to the meals of one man fifty-nine days. The food furnished 49 grams protein and 2,240 calories at the cost of three cents per man per day.

"The table below shows the kinds and amounts of food used, together with the estimated amounts of lime and magnesia . . . furnished by each and by the diet as a whole."

ESTIMATED ASH CONSTITUENTS IN DIETARY STUDY No. 100

Food Materials Used.	Calcium oxide. Grams.	Magnesium oxide. Grams.
Meat: Bacon and lard (meat protein, 131 grams)	.099	.248
Flour, 9,470 grams	2.651	2.462
Corn meal, 20,920 grams	1.882	27.614
Rice, 710 grams	.085	.426
Collards, 255 grams (as cabbage)	.147	.053
In total food eaten	4.864	30.803
Per man per day	.082	.522

Here we find a large preponderance of magnesia over lime, more than 6 parts to 1, nine-tenths of the total being derived from corn meal, a fact which has a direct bearing upon the prevalence of pellagra throughout the Southern states, since the intimate relation is susceptible of demonstration. Such being the case, what shall we say regarding treatment with a death rate of 65 per cent., when routine methods include the employment of magnesia in some form?

These dietary studies are exceptionally interesting and suggestive; they should also prove instructive. For example, we find by actual calculation that the teacher's family in Indiana takes daily more than seventeen times as much lime and only about five-sixths the amount of magnesia as compared with the negro's family in Alabama. Even at six times the cost, when we consider the physical and mental output, there can be no question as to adaptability. Viewed from the standpoint of public health, we can readily understand the disadvantages, not to say embarrassments, arising from a dietary containing magnesia—in excess—and that

too, without dwelling upon the mortuary statistics—as will appear from a brief study of its effects upon the nervous system.

MECHANISM OF THE NERVOUS SYSTEM.

Disease may be either seasonal or cyclic. Acute, infectious diseases, such as diphtheria, scarlet fever and measles, are expected when cold weather begins; diseases of children involving the digestive apparatus are always prevalent during the summer season; such disorders as tuberculosis, Bright's disease and diabetes are cyclic; that is, there is an arrest in the progress, due to some occult influence which augments resistance from time to time. Now, it can be shown that infectious diseases are more serious when the patient suffers from an excess of magnesia. Recognition of this new factor in the case of "summer complaint" in children would greatly diminish sickness, and besides, it would reduce the death-rate—it would require but a slight addition of lime to the daily supply of milk. In the case of cyclic disorders, they would not appear at all had there not developed insidiously this chemic deviation in the relative proportions of lime and magnesia, all of which will be understood from a brief study of the nervous mechanism.

The nervous system is comprised of three divisions, inter-related and inter-dependent: (1) Motor nerves have their origin in the brain and send motor nerve impulses—to the muscles, for example; (2) Sensory nerves carry sensory impulses to the brain, where they are interpreted—thus, we can distinguish the sensation of a scratch from that of a bruise; (3) Vasomotor nerves regulate or control the caliber of the blood vessels, so that sudden emotion or shock relaxes, while excitement or "stimulation" increases tension.

These various functions, voluntary and involuntary, are conducted through the activity of the nerve cells, the latter being built up from microscopic bodies or cells called protoplasm or protoplasmic cells, the physiologic unit of all living

matter, animal or vegetable. Bearing in mind that these protoplasmic cells are organized structures possessing all the characteristics of life, nutrition, excretion, motility, reproduction and response to stimuli, we cannot deny them mentation. Moreover, these protoplasmic cells respond to the usual and ordinary normal nerve stimuli, electric, thermic, mechanic, and chemic, in precisely the same manner as the body as a whole; hence, the logical deduction.

Without cell mentation, life would be incomplete, lacking initiative as well as sensation—on a par with a lump of clay or a mass of conglomerate rock. Therefore, it is a safe proposition to claim that mentality will be diminished in direct proportion to the arrest of function or hindrance in the transmission of nerve impulses. This is well illustrated in the case of the negro farmer's family in Alabama, as contrasted with the teacher's family in Indiana, the magnesia excess acting as a brake upon initiative and mental development.

Studied from the physical or physiologic standpoint, the effects are similar, if not identical, since the magnesia deposits likewise interfere with the purely vegetative functions, modifying nutrition, arresting excretion, inhibiting motility and laying an embargo upon reproduction, because these new combinations fail to respond to any of the normal nerve stimuli, except chemic. This clinical fact is conspicuous as a result of acute illness, such as rheumatism, followed by pain and stiffness of the joints together with heart complications; typhoid fever, with a lingering convalescence and perhaps neuralgia or neuritis along with marked impairment in the nutrition of the bones incident to the lime depletion consequent upon the disease. Influenza and pneumonia with their untoward sequelæ may be cited as additional illustrations to confirm the working hypothesis of magnesium infiltration, the severity and persistence of these disorders being directly traceable to this factor. Proof of this is to be found in the results of treatment conducted for the sole purpose of correcting this chemic deviation, the effects being immediate and marked.

Chorea (*St. Vitus' dance*) supplies an excellent illustration as well as a convincing demonstration. Beginning gradually, as a result of some obscure nerve derangement, over-exertion from study, play or work, excitement arising from fright, injury or society functions, and frequently without apparent cause, no treatment has proved reliable and successful—although a few weeks' sojourn in the country, without medication, often suffices to effect a permanent cure. This is evidently due to improved nutrition arising from a dietary richer in lime—the chemic problem in nutrition being automatic and self-adjusting. But chorea may be cured at home—without medication—by readjustment of the dietary; medical treatment should be confined to the employment of lime salts alone, thus affording a demonstration of the potentiality of this new factor in disease.

Infantile paralysis differs from chorea in respect to invasion, the onset being sudden, entirely unexpected and frequently not recognized for several days. While no doubt exists in the minds of scientists as to the causative factor, the exact nature of the infection is still unknown—but there is no reason or excuse for failure or refusal to remedy the effect upon the nerve structures involved. Assuming that the obstruction in the transmission of motor nerve impulses is due to factitious deposits of magnesia, a non-conductor of electricity, and that the case is of recent occurrence, the cellular structures still maintaining their organized character, but unable to functionate, the administration of lime will effect chemic dissociation of the magnesia—when the lime takes its place, and eventually function is completely restored. Cases of long standing are less amenable to treatment; indeed, many such fail to show any response whatever to chemic stimuli, owing to the production of new tissue entirely different from the original—adventitious tissue—a subject more fully elaborated in studying the chemic problem.

Insomnia, an almost universal affliction in the case of those engaged in sedentary employment, furnishes an apt illustration of another type or variety of magnesium

infiltration, as compared with those previously studied. Considered as an entity, insomnia might be defined as—disseminated magnesium infiltration—in contra-distinction to chorea and locomotor ataxia, where it is local or circumscribed. Still, when studied from the chemic viewpoint, it is not difficult to trace its origin to digestive disturbances arising from lack of a properly “balanced ration”—in respect to lime and magnesia—because correction of this defect removes the chemic deviation, when the acute susceptibility or irritability of the nervous mechanism disappears.

In answer to the question, “Why is insomnia?” the reply is ready at hand: Because the presence of magnesia in excess, hinders, impedes or destroys the uninterrupted transmission of nerve impulses—motor, sensory and vasomotor. Consecutively arises the question, “How is it brought about?” and the answer is equally satisfactory: The digestion is faulty—tardy, imperfect or incomplete—giving rise to decomposition of animal foods with fermentation of the starchy food-stuffs, thereby creating an excess of acid, not to mention the acidity due to the presence of bacteria. This acid, in turn, depletes the lime content of the cells, magnesia taking its place, because lime is the stronger base. The magnesia-charged cells lack certain essential properties required to sustain life—both excretion and imbibition are at a standstill; they lose the power of motility and the capacity for reproduction, and they do not respond to any of the ordinary forms of nerve stimuli—except chemic.

Farmers living in the so-called arid regions of the United States have learned by observation and experience that these magnesia-charged soils cannot support vegetable life. The reaction of the soil is acid, sour; the plant rootlets shrivel up, turn black and die. Hence, the demand for lime as an antidote, a chemic stimulus. By means of irrigation, these arid soils have become wonderfully productive, the soluble magnesia salts in excess being leached out. So, in the case of insomnia from the presence of magnesia in excess, we must use lime as an antidote to promote magnesium disso-

ciation, together with an abundance of liquids to flush the tissues and neutralize acidity.

The object of rational treatment, therefore, is to *make the cells work*, by placing them under normal conditions as regards their chemic status. Recalling the normal nerve stimuli, electric, thermic, mechanic and chemic, what besides temporary benefit is to be expected from electricity, from heat and cold, from mechano-therapy, or even from psychic stimulus, when we have to deal with a purely chemic deviation?

Mucous catarrh and skin diseases should be grouped when studying the mechanism of the nervous system, because they are mutually as well as sympathetically involved when magnesia develops or causes derangement of metabolism. This is a comprehensive term employed to cover nutrition, and includes all the various intricate chemic and physiologic processes incident to absorption and excretion—anabolism, or building up, and katabolism, or breaking down, diet being the essential factor in maintaining its integrity. As has been pointed out, impairment in nerve conduction is consecutive to magnesium infiltration; reversion in cell function follows, with defective assimilation and retention of poisonous waste products, when the mucous membrane and the skin take on a vicarious function, as seen in the diarrhea of summer complaint and tuberculosis, or the profuse night-sweats of chronic disease and following pneumonia and typhoid fever. In all such instances we find a diminished alkalinity of the blood, owing to excessive acidity, together with magnesia in excess from the same cause. Correction of this chemic deviation will restore normal tissue change—when vicarious function ceases and health is restored.

THE CHEMIC PROBLEM.

The chemic problem in nutrition hinges upon the status of the reactions and reflexes, a subject partly explained in studying insomnia. It is of prime importance and will

bear critical investigation. A brief discussion will be sufficient to show the practical bearings of these simple tests. In testing the chemic reaction of liquids, we employ litmus paper. When a fluid turns blue litmus paper red, it means acidity; if no discoloration takes place, it is alkaline or neutral. Now, under normal conditions, certain body fluids are acid—the perspiration, the urine and the contents of the stomach. Alkaline fluids include the blood, the saliva, the lymph and intestinal secretions. The bile and all the body tissues are normally alkaline—acid production, except in the stomach, being an excretion or end-product. The bile and pancreatic juice are always alkaline, but their relative alkalinity may be diminished when the body fluids and tissues become highly charged with acid incident to impairment of the digestive capacity. When acid excess supervenes, the alkalinity is diminished, the oxygen-carrying capacity is lessened, and generally, this surplus acidity is shown in the saliva—which may be easily tested. In advance of this evidence, however, the intestinal secretions show acidity, indicated by symptoms of indigestion together with abnormal reflexes.

A reflex is an involuntary action arising from nerve stimulus—electric, thermic, mechanic, or chemic. The so-called “knee-jerk” furnishes an apt illustration of mechanic stimulus. When one leg is thrown over the other, tapping the tendon below the knee-cap causes an upward movement of the foot, involuntary, because it is independent of the brain centres. When the nerve structures are charged with magnesia, a non-conductor of electricity, the knee-jerk is modified—diminished, exaggerated or absent altogether—and this peculiar electro-plating process involves the entire nervous system, motor, sensory, and vasomotor. Thus, we have a ready means at hand for determining the presence or absence of this new factor in disease—by testing the salivary reaction and the knee-jerk.

A **synopsis of assimilation**, primary and secondary, will shed further light upon this intricate problem. Digestion, or primary assimilation begins when food is taken into the

mouth. While mastication is going on, the ptyalin of the alkaline saliva acts upon the starchy foods, so that they enter the stomach partially digested, there to remain until discharged into the intestine. Only nitrogenous foods, or meats, are digested in the stomach—in an acid medium. After a variable period—two hours, more or less—the stomach begins to discharge its contents into the small intestine, where they come in contact with the alkaline bile combined with the pancreatic fluid, also alkaline, intestinal digestion being completed in alkaline medium. The bile acts only upon fats, along with steapsin from the pancreas, while amyllopsin, also from the pancreas, completes the digestion of starchy foods, begun in the mouth. However, it happens that some of the nitrogenous foods escape from the stomach in a partly digested form, when trypsin, another pancreatic ferment, which acts in both an alkaline and acid medium, proceeds to complete the digestion; but the outward flow from the stomach is guarded automatically by the degree of acidity and the capacity of the bile and pancreatic fluid to effect alkalescence of the product. Thus, we may estimate, although we cannot determine definitely the deleterious effect produced by acid excess—it delays digestion and favors decomposition of the nitrogenous foods by microbic action. Hence, the decided advantages of fasting for the relief and cure of chronic indigestion.

Besides the ferments named, there are several other enzymes—unorganized ferments—which play an important part as “activators,” or chemic stimuli to promote the digestive secretions just as jelly added to bread and butter increases palatability. Microbic digestion should not be overlooked. For example, excessive acidity may so hinder the digestion of nitrogenous foods that they reach the lower portion of the small intestine imperfectly digested. Carrying with them the usual bacterial flora, decomposition develops to an alarming degree, and taking place in the immediate vicinity of the appendix, it is easy to understand how infection may extend, giving rise to appendicitis.

Secondary assimilation, involving as it does the transformation of inanimate food substances into living, organized tissue, is a more complicated problem. That portion which is converted into animal tissue undergoes what is termed a physiologic change; the separation of inorganic substances for bone-making purposes involves a chemic change, but from what has been said, it will be apparent that the chemic status must be favorable, else there is impairment in nutrition. In other words, it is a practical impossibility to upbuild and maintain a normal, alkaline tissue from acid materials in an acid medium—because the cells refuse to work. Hence, the corollary: Impaired digestion gives rise to acidity; this in turn, leads to impaired nutrition, with more acidity and further embarrassment of the digestive capacity. Therefore, it is the part of wisdom to conserve the primary assimilation, to the end that this vicious circle may be avoided.

Now comes an inquiry relating to this new factor in disease. The information advanced so far is common property. That acidity is the dominant factor in indigestion is an open book. When we begin to study the effects, local and systemic, attending acid excess, it is like entering a new and unexplored country. There are no beaten paths such as we have previously followed; nor do we find any land-marks or guide-posts, because no traveller has blazed the way. Hence, the necessity for plotting the territory and driving stakes for the guidance of future explorers.

The first question naturally relates to the constitutional effects produced by acid excess—previously considered, but the explanation advanced is too superficial, since it merely deals with symptoms instead of basic or fundamental causes. This chemic deviation is responsible for radical changes in structure, which impede, hinder, or destroy the uninterrupted transmission of nerve impulses. How impairment in nutrition arises in consequence will be readily understood when it is stated that acid depletes the lime content of the tissues, including nerve tissue, magnesia taking its place. Magnesia-charged tissues do not function-

ate like normal structures, as previously stated, because they are incapable of carrying the electric current, the energy responsible for the transmission of nerve impulses.

Magnesium infiltration is substantially, an insulation process; it modifies the electric conductivity of the tissues, as pointed out in chorea and insomnia. When it involves the motor nerves, the muscles which they supply are paralyzed—as in infantile paralysis. When sensory nerve trunks are affected, as in locomotor ataxia, sensation is abolished. In both instances there are characteristic disturbances of the reflexes together with acid reactions.

Invading the vasomotor nerves, there is contraction or increased tension of the arteries and high blood-pressure, leading to apoplexy, paralysis and heart failure. The latter, a somewhat indefinite term, is satisfactorily explained on the basis of this working hypothesis—it is due to a “short-circuit” of the electric current, the heart being insulated. For example, in conversation with an expert mechanic recently, he related an interesting experience with his motorcycle. While riding along the road the machine would “buck” or jump back occasionally, much to his surprise. Examination of the battery showed that one of the wires had lost part of its insulating material, so that the explosion occurred at the wrong time, an apt illustration of the accident known as heart failure. Fortunately, these studies have led to a better understanding of the causative factors, so that it is now possible to discover and demonstrate the magnesia heart—and what is more to the purpose, the chemic deviation can be corrected and a fatal termination avoided.

Nature of Magnesia Deposits.—Finally, a word in regard to the probable nature, or form in which magnesia deposits occur. In acute diseases, notably summer diseases of children, acidity is pronounced. A few hours suffices to deplete the lime, when replacement occurs, with profound nervous depression—because of the chemic deviation in the cells.

In the case of neuritis, neuralgia, and neurasthenia, the

reduced alkalinity of the blood is sufficient to effect a chemic union between the colloid (starch-like) particles of the nerve tissue and magnesium oxide, the latter being found in the system as a result of oxidation. We are indebted to Edison for this important discovery. In his experimental work to perfect the electric storage battery, it was found—after about nine thousand chemic tests extending over a period of two years—that magnesium oxide, or calcined magnesia, was the only substance which would precipitate organic colloids in alkaline solution and prevent “frothing.”

As age advances, there is a tendency to crystallization, when we find magnesia united with calcium—to produce hardening of the arteries, arterio-sclerosis, this constitutional effect being in evidence throughout the entire system. But this systemic effect may begin prematurely, when old age is precipitated.

Thus, we have three types of magnesium infiltration: (1) Simple replacement; (2) Chemic transformation; and (3) United with calcium. In addition to this should be mentioned the probable and possible effects arising from the obstruction, aside from the various derangements of function already noted. For example, neuritis is only a technical term for inflammation of a nerve. Inflammation long continued is liable to destroy the tissues and lead to the formation of new structure entirely different from the original. Should bacteria find access to the inflamed area, there is pus-formation and perhaps septic infection, so that for all practical purposes, there is no escape from the deleterious effects of magnesia in all kinds of sickness, acute, subacute, and chronic. It is a mistake to say that a person is “run down,” that his nervous system is “shattered” and that he needs “rest” or “exercise,” determined by the personal equation of the medical attendant. Rather, we should say that a person is lop-sided, because of acid excess, that chemic deviation has electro-plated his nerves, so that his batteries don’t work, and that the vegetative functions are temporarily suspended—all due to derangement of the digestive apparatus.

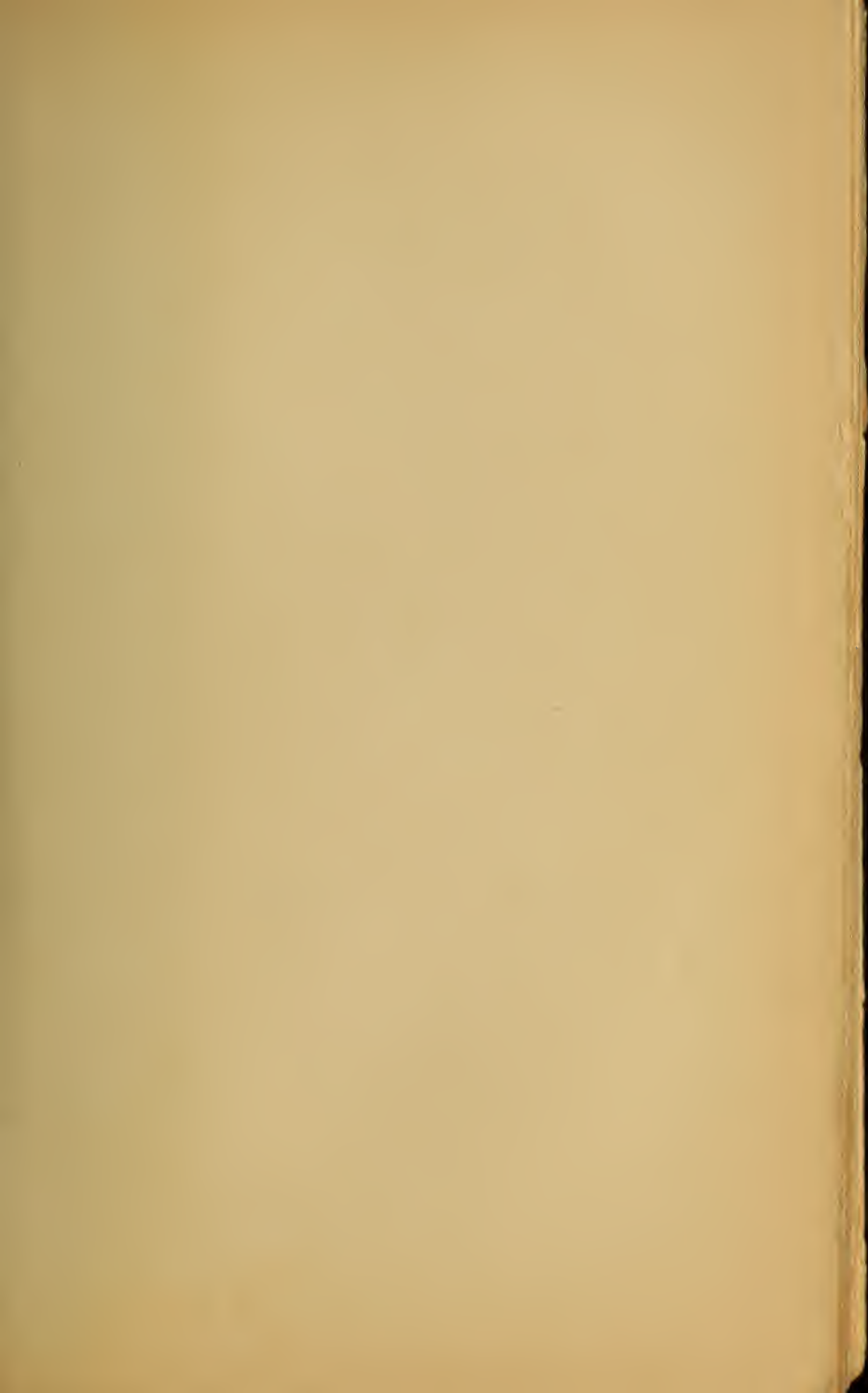
These teachings make for simplicity and efficiency in the treatment of disease, by throwing a strong search-light upon certain well known scientific facts which have thus far escaped attention—their adaptability has been overlooked. Fundamental in character, however, their practical application is not questioned. Hence, the wide-spread prevalence of sickness may be checked and the waste of human life arrested. There is no demand for expensive apparatus or costly appliances, and a complete knowledge of the methods available may be gleaned from our text-books on physiology, without reading between the lines, so that only sheer wilfulness and fatuous tradition interpose to prevent their immediate realization.

INJURIOUS EFFECTS OF MAGNESIUM ON PLANT LIFE.

Laboratory studies, showing the injurious effects of magnesium on the growth of plants, are especially interesting in this connection, since the "Food Problem" in plant and animal life is essentially the same, at least, this is true in respect to calcium and magnesium. The monograph, by True and Bartlett,¹ supplies a number of graphic illustrations, so that a brief reference to them here will, in a measure, confirm the claims already advanced. As a matter of fact, these experiments present ocular demonstration—perhaps more convincing to the skeptics than dialectics, although it is like proving an axiom or exposing an absurdity—a waste of energy.

The experiments were made with field peas grown in solutions of calcium and magnesium nitrates, singly in varying strengths as well as in combination, and relate exclusively to the purely physical results. The authors intend following up this work by studies of other plants and other solutions, but most important is this announcement:

¹ Absorption and Excretion of Salts by Roots, as Influenced by Concentration and Composition of Culture Solutions, Washington, D. C., 1912.



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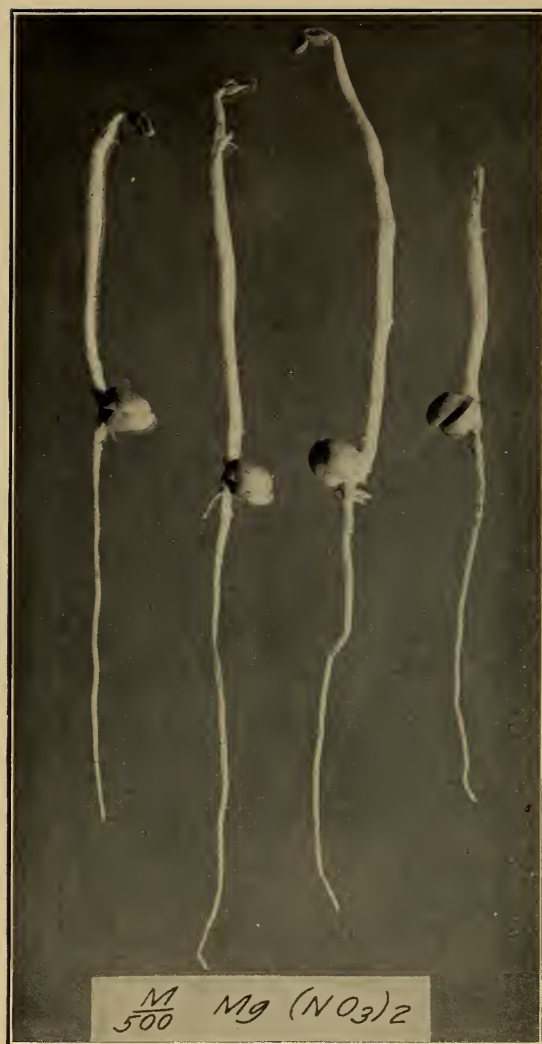


FIG. 1.—SEEDLINGS OF CULTURE 4, Experiment C.

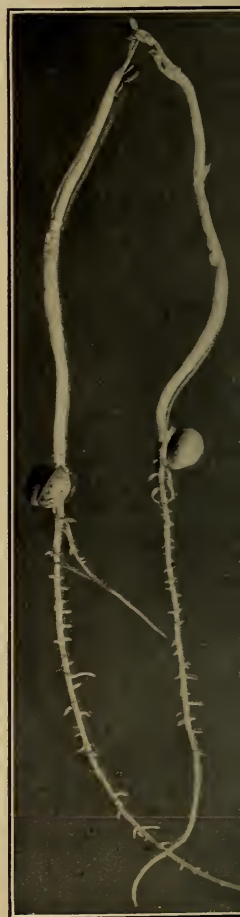


FIG. 4.—SEEDLINGS OF

Reproduced from *Absorption and Excretion of Salts by Roots, as Influenced by* by RODNEY H. TRUE

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ion in pea seedlings incident to Magnesium Nitrate—in solution—with
action of Calcium. Duration of experiment, seven days.

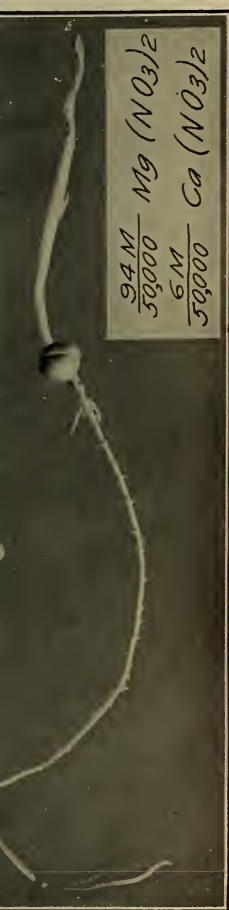


FIG. 10, Experiment C.

Concentration and Composition of Culture Solutions, Washington, D. C., 1912,
WILEY HARRIS BARTLETT.

IN NUTRITION.

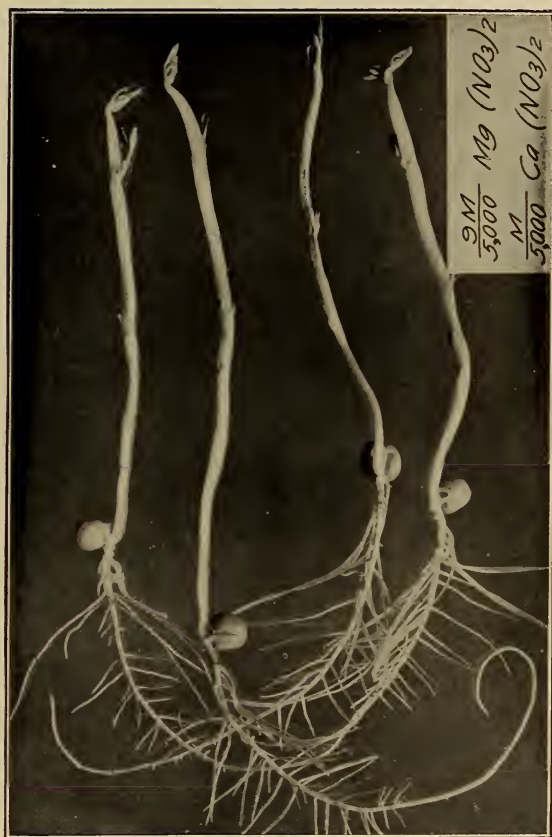


FIG. 8.—SEEDLINGS OF CULTURE 14, Experiment C.

"Future work will be directed toward determining the chemical composition of the culture solutions after plants have grown in them, and also of the plant roots themselves, in the hope that the results may throw further light upon the mechanism of permeability."

The method of procedure consisted in setting up cultures of seedlings in glass beakers, four in each, when the primary root has attained a length of 4 or 5 centimeters—and before the appearance of any laterals. The experiments, shown in the accompanying illustrations, were continued for one week, at which time the plants had reached the maximum development, and as the authors comment, they show "the striking contrast between a dead, unbranched primary root, and a luxuriantly developed root system with vigorous laterals. The intermediate cultures showed a perfect transition between these two conditions."

The cuts (Experiment C.) show in the most graphic manner possible, the deterioration attending the presence of magnesium alone—in excess—and also the revivifying effects of calcium. The marked effect of infinitesimal quantities is almost incredible. For instance, referring to Experiment 5, the authors say:

"The concentration of calcium nitrate which made the difference between roots with almost no laterals and roots with well developed laterals, was 1 part, by weight, of calcium in 50,000,000 parts of water."

Here is the report on the condition of roots (Experiment C.), when photographed: (Plate I.)

Fig. 1.—Culture No. 4—Primary dead; no laterals.

Fig. 4.—Culture No. 10—Laterals more numerous and somewhat longer than in No. 9.

Fig. 8.—Culture No. 14—Root system perfectly developed.

Another series of cultures (Experiment 3, same period) shows the marked contrast between magnesium and calcium,

each alone, in more concentrated solutions (Figs. 11 and 13), and for comparison, I have added Fig. 16, from the same experiment, showing root development in distilled water. (Plate II.)

The monograph covers a complete record of eight experiments, each including fourteen cultures, all of them having a direct bearing upon the chemic problem in nutrition, since the logical deductions are destined to exercise a far-reaching influence upon the future treatment of disease. They emphasize the claim for simplicity and efficiency—and they also foreshadow practical methods for insuring health and promoting longevity.

Electrolytes from Plant Growth.—It would be interesting and instructive to study the peculiarities noted in the electrolytes, that is, the conductivity of the culture solutions before, during and at the end of the experiments, the rate of absorption and excretion in dilute and concentrated solutions of calcium and magnesium alone, in equivalent solutions, graded, and in solutions containing both in constant ratio, but varying in concentration, but such investigations more properly come within the domain of laboratory research. It will suffice to reproduce here the "Conclusions" as follows:

1. That there is a definite concentration for each salt or mixture of salts at which the roots of peas absorb and excrete electrolytes at the same rate;
2. That if a culture solution is initially less concentrated than this equilibrium concentration, excretion from the roots over-balances absorption;
3. That if a solution is initially more concentrated than this equilibrium, absorption over-balances excretion;
4. That absorption from solutions initially above equilibrium concentration may carry them far below this concentration;
5. That the extent to which pea roots can carry the concentration of a solution below equilibrium concentration depends upon the ratio of magnesium to calcium;

Illustrating "THE FOOD

Shows by contrast the effects of Magnesium and Calcium on pe
by comparison. Dur

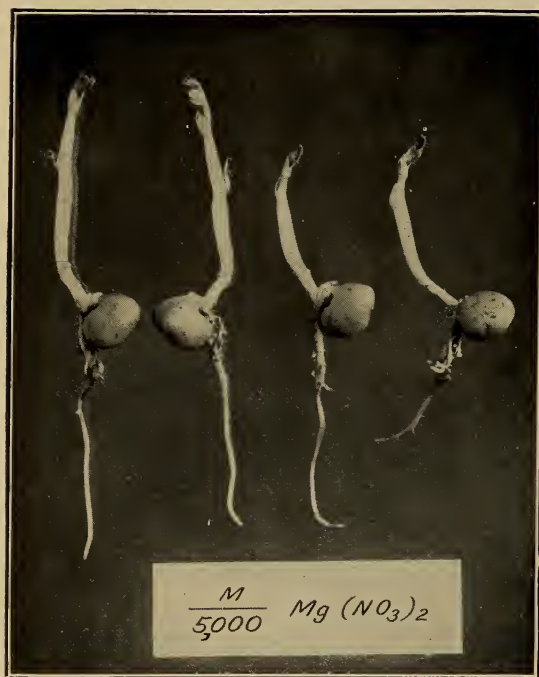


FIG. 11.—SEEDLINGS OF CULTURE 2, Experiment 3.

Reproduced from *Absorption and Excretion of Salts by Roots, as Influenced*
by RODNEY H. TRUE

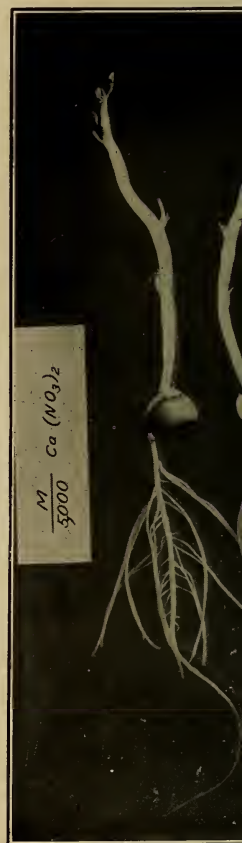


FIG. 13.—SEEDLINGS OF CULTURE 2, Experiment 3.

THE CHEMICAL

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gs in solutions of equal strength; also the effect of distilled water,
experiment, seven days.

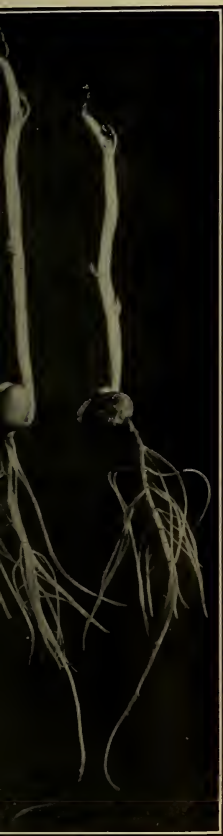


FIG. 12, Experiment 3.

Concentration and Composition of Culture Solutions, Washington, D. C., 1912,
ALEY HARRIS BARTLETT.

IN NUTRITION.



FIG. 16.—SEEDLINGS OF CULTURE 14, Experiment 3.

6. The molecular ratio which favors maximum absorption is $\frac{1}{1}$;

7. That the ratio of magnesium to calcium which insures good development of pea roots is $\frac{9}{1}$, if the solutions are so concentrated that their magnesium content alone would inhibit the development of lateral roots;

8. That this ratio is nearer $\frac{9.9}{1}$ if the solutions are so dilute that the magnesium content alone would not inhibit the development of lateral roots.

Regulating Medication.—Various questions now arise relating to medication—when it has been shown by clinical investigation that we have to deal with magnesium in excess in the body fluids and tissues. Were it possible to obtain photographs of the nerves, or say, the tissues of an organ such as the liver, the heart, the kidneys, or the brain, we could make a rough estimate of the deterioration, but not to the same extent as in the case of plants. An examination of the blood would afford but relative information, owing to the variable concentration—excretion from the tissues being augmented by dilution beyond the equilibrium, while absorption is favored by concentration.

This probably accounts for the almost universal mandate to drink plenty of water—an utterly useless procedure when it is recalled that the magnesium is held in chemic combination with the soft tissues the same as in bone. “Water-drinkers” overlook the dangers of washing the magnesia out of their bones as well as their brains.

Another therapeutic absurdity confronts us should we attempt to counteract magnesium infiltration by administering calcium on the same basis as anemia is treated—by employing thirty to fifty times as much iron as is furnished by the daily diet. A person would have to take a table-spoonful of slaked lime three times a day.

According to Langworthy,¹ “A recent estimate of mineral

¹ Langworthy, Food Customs and Diet in American Homes, Washington, D. C., 1911.

matter required per man per day calls for the following amounts:

ESTIMATED ASH CONSTITUENTS REQUIRED DAILY.

	Grains.	Grams.
Calcium oxide	10½ to 15	0.7 to 1
Magnesium oxide . . .	4½ to 7½	0.3 to 0.5
(Iron)	1/16 to 1/5	0.006 to 0.012)

In order to determine a rational basis for medication, therefore, we must be guided by the requirements of the body under normal conditions conjointly with the evidences brought forward relating to the deleterious effects of magnesia upon plant life, together with the antidotal action of calcium. Thus, in the case of children, suffering from acute bowel disorders ("summer complaint"), where replacement has occurred, a comparatively small dose of calcium, acting according to the law of mass, will produce an immediate and marked improvement. Owing to the rapid tissue change in children and adolescents—with a normal electrolyte—tissue repair is prompt and permanent; that is, relapses do not occur, such as we see following the employment of antiseptics.

In the case of chorea, the dose should be larger than in acute disorders, because of the fact that magnesia involves the entire nervous mechanism, but the beneficial effects are notably prompt. Enlargement of the thyroid gland—in young women—readily yields to precisely the same treatment as chorea.

In adults we have to deal with chemic transformation, attended with more or less inflammatory reaction, along with a tendency to new tissue formation; hence, the demand for an alterative, in addition to the calcium, to cause disintegration of the inflammatory deposits and promote absorption. Treatment of such cases differs in no essential from that of Jacksonian epilepsy, arising from disease of, or injury to, the cerebral cortex. It is an interesting study to note the effects of chemic stimulation—the severity of the attacks is diminished, they are less frequent, and soon subside

altogether, while the mental condition of the patient shows improvement from day to day.

Coming now to the central idea, diseases of the nervous system, and assuming that the entire list may be classed in the same category, due either directly or indirectly to magnesium infiltration, the question arises: How shall we regulate medication?

Taking neurasthenia as an illustration, I have grouped the chemic deviations under three distinct headings:

- (1) Dominant, or primary;
- (2) Consecutive, or secondary;
- (3) Incidental, or symptomatic.

Studying the toxic action of magnesium upon plant rootlets, arresting growth and development, the reader will readily concede that we may have the counterpart in animal life.

For the purpose of identification, or diagnosis, the effect of chemic deviation may be symmetrical, as in infantile paralysis; it may also be localized, as in neuritis and Jacksonian epilepsy, or disseminated, as in chorea and neurasthenia. Again, the area involved may be circumscribed, as in Raynaud's disease, a single organ may suffer, as the pancreas in diabetes, the kidneys in Bright's disease, or certain portions of the cutaneous envelope, as in eczema. Besides, we may have a local manifestation which presents a symptom-complex, or syndrome, as in thyroid enlargement, while still another peculiarity relates to invasion of the nerve mechanism—the motor tracts to the exclusion of the sensory tracts, and *vice versa*. Thus, in arterio-sclerosis, the vasomotor nerves alone appear to be involved, although this is but a superficial view.

Aside from the intercurrent or incidental symptoms, arising for the most part from the constitutional invasion, in neurasthenia we have to deal with disseminated infiltration—due to the chemic union of magnesium oxide with the organic colloids of the nerve structures. For experimental purposes we might give calcium in small doses, either in proportion to the body weight or to the estimated weight of the blood. Thus, to a man weighing 156 pounds (1,092,000 grains), or

a woman, weighing 117 pounds (819,000 grains), when we administer a dose of one grain, we have the following proportions, by actual weight:

Dose, 1 grain—Man = 1 to 1,092,000;
Dose, 1 grain—Woman = 1 to 819,000.

Calculated on the basis of the weight of blood, 1 pound to 13 of body weight, we have the following:

Dose, 1 grain—Man = 1 to 84,000;
Dose, 1 grain—Woman = 1 to 63,000.

Referring to the preceding tabulation, showing the average daily intake of calcium to be 10.5 to 15 grains, the suggestion to employ a single grain three times a day will be denounced as absurd, but this is the actual dosage usually employed in the cases of neurasthenia reported in a later section. Not only that, it is the dosage employed in Jacksonian epilepsy, infantile paralysis, neuritis, neuralgia, Raynaud's disease, and magnesia heart, confirming the claims for simplicity and efficiency.

In addition to calcium, however—magnesia is rarely demanded—we must take measures to restore the normal condition of the electrolyte as regards chemic reaction—that is, we must restore the normal alkalinity of the blood; and besides, an alterative is essential, to promote absorption of inflammatory products, all of which is fully elaborated in the accompanying clinical reports.

PELLAGRA.

Pellagra is a disorder so closely related to dietary studies that it naturally falls into line in connection with the foregoing records, the disease having recently developed in this country. The earlier reports showed alarming mortuary statistics, and even now, those who escape a fatal termination find themselves seriously handicapped both mentally and physically—in consequence of chemic deviations taking

place in the tissues which interfere with normal tissue change, or metabolism.

A Disorder of Nutrition.—While diseased or decomposing grain (corn) is now recognized as the pathologic factor, in view of the imperfect recoveries which follow attacks, we must look further to discover the indirect, secondary or consequential effects, and the present inquiry will be limited to this question. Necessarily, of course, it must include a consideration of the therapeutic measures which are best adapted to overcome or counteract the effect of the disease upon the health. In other words, it will endeavor to explain how pellagra disorders nutrition, and further, the investigation, by logical deduction, will point out the line of treatment which should be adopted in such cases. In the opinion of the writer, the underlying causative factor is to be found in magnesium infiltration, a pathologic condition in which there is depletion of the lime content of the nuclear proteid, being the counterpart of that which occurs in plant life when magnesium salts in excess cause destruction and death of the protoplasm, since magnesia acts as an insulator, impeding the uninterrupted transmission of nerve impulses.

Normal Acidity of Corn Meal.—A significant factor in this connection relates to the normal acidity of corn meal; that is to say, when corn meal of good quality is submitted to the usual chemic tests it shows a relative acidity varying from 13 to 25 per cent. When corn meal of an inferior quality—due to decomposition from various causes—is tested, the acidity is found notably increased, in some cases running as high as 95 per cent.

Apparently then, the indigestions must be largely due to this increased acidity, even without including nitrites as a factor, because nearly all the corn meal in general use at the present time is obtained from degerminated grain—the mineral salts being confined almost entirely to the germ itself.

With this explanation, we can readily understand how pellagra may appear in endemic form in different institutions,

when the food supplies are purchased from the lowest bidder and no chemic tests conducted to determine their purity. On this basis also, we can account for the appearance of sporadic cases and local outbreaks—evidently due to the employment of a decomposing food product characterized by an excessive acidity.

That all patients in an institution, or all persons in a given locality are not equally affected, is no argument against the deduction. There must be individual susceptibility, just as there is susceptibility to typhoid infection from water or milk—and the writer is of the opinion that this peculiar susceptibility is due to identical conditions in both instances, the chemic deviation designated acid excess.

No one will seriously question the statement that the ingestion of decomposing grain will give rise to symptoms of indigestion; and in the light of recent pathologic findings it will be readily admitted that distinct organic changes take place consecutively, not only in the intestinal tract, but in the superficial tissues as well, all going to show the profound impression produced upon the trophic nervous system. It would be interesting also to consider the coincident acidity associated with practically all forms of indigestion, by which a vicious circle is established, tending to make permanent a temporary indisposition. In other words, a clearly manifested indigestion will not be followed by spontaneous recovery—reasonable care being required in respect to diet. Inasmuch as the medical profession as a whole does not concede this hypothesis, this factor will be referred to merely incidentally, since the evidence will be quite sufficient to confirm the working hypothesis.

Chemic Constituents of Corn.—The first question to be considered has to deal with the chemic constituents of the grain itself. Does the distribution of lime and magnesia in maize differ from that of other grains to such an extent as to warrant criticism on the score of chemic composition?

The following data from Liebig's investigations furnish a substantial basis for the suspicion assumed, these analyses being made by Osten, Way, Weber and others:

PERCENTAGES OF LIME AND MAGNESIA IN THE ASH OF THE GRAIN
OF GRAMINEÆ.

	Magnesia.	Lime.
Barley	8.29	2.48
Oats	7.70	3.70
Wheat	11.75	3.30
Maize	13.60	0.57
Rye (bran)	15.82	3.47

It will be observed that there is a preponderance of magnesia in all the grains, but a marked discrepancy in the lime content of maize—by molecular weight, the average is 17 molecules of lime to 100 molecules of magnesia. By absolute weight, we have the following:

PREPONDERANCE OF MAGNESIA OVER LIME.

Barley	3.2621 times.
Oats	2.0800 times.
Wheat	3.0560 times.
Maize	24.0000 times.
Rye	4.0560 times.

In plain figures, maize contains nearly eight times as much magnesia as barley, twelve times as much as oats, eight times as much as wheat, and six times as much as rye—and the dangers of improperly cured rye as a food have long been recognized, a clinical fact which will serve to clear up the “mystery” relating to pellagra from decomposed maize.

In this connection should be mentioned certain pertinent facts concerning the effect upon plant growth from magnesia in excess, as well as that which attends a deficient supply of lime, all of which has been worked out in detail by Dr. Oscar Loew (*The Physiological Rôle of Mineral Nutrients*), since identical effects are reproduced in the human organism and may be studied at the bed-side.

Deficiency of Lime and Its Effects.—“Stohman kept maize shoots alive for some time in a culture solution free from lime, but all development gradually ceased with the consumption of the stored-up lime.” At the end of several weeks, the addition of calcium nitrate produced striking

effects—"hardly five hours elapsing before new buds pushed out from the sickly looking tips." The precise counterpart of this is seen in the case of cholera infantum—after the absolute failure of intestinal antiseptics together with the most approved dietary—administration of the appropriate lime salt enabling the patient to recover over night, convalescence being well established within twenty-four hours.

As further evidence that a deficiency of lime kills off the children, rich and poor alike, the observations of Heiden may be quoted: "Maize and peas in culture solution without lime live but four weeks, while in culture solutions without magnesia maize lived ten to twelve weeks and peas past eight weeks."

An interesting and instructive record is credited to Dr. E. F. Smith, covering his investigations as to the relative proportions of lime and magnesia in the leaves of healthy and diseased peach trees—so-called "yellows." It was found that calcium oxide in diseased leaves was diminished twenty-five to fifty per cent., while magnesium oxide was increased in like percentages—in one instance the magnesium oxide was nearly five times that found in healthy trees.

A note should be made here to the effect that neurasthenia supplies the counterpart of this abnormal condition, the calcium salts being diminished, while magnesium oxide unites with the organic colloid of the nerve structure—to impede, hinder, or destroy function. Edison (personal letter) has noted "a curious fact that only magnesium oxide will precipitate organic colloids in alkaline solution," but this is precisely what takes place when magnesium oxide, as "calcined magnesia," is administered as a "sedative," effecting insulation—a travesty on scientific medicine.

In the cultivation of algæ the experiments of Bokorny showed decrease and shrinkage of the chlorophyl such as to warrant the conclusion—"that the results can only be attributed to the absence of lime." This should be taken as a pointer for those who regard iron as an essential remedy for anemia, chlorosis, and inanition, when, as a matter of fact, deficiency of lime is the primary cause, such cases

showing immediate and marked benefit following its employment. Indeed, when the proper time arrives for hematinics there is usually no demand for them.

An experimental investigation conducted by Boehm relating to the irregular transportation of starch in certain plants when lime salts were absent from culture solutions is especially suggestive in connection with the cause and treatment of obesity. On the addition of lime salts, the plants recovered, "while on the other hand, the addition of magnesium salts hastened their death, with accumulation of starch in the pith and bark of the lower part of the stem, death beginning in the upper part."

A peculiar concatenation of circumstances lies in the fact that, "while lime is indispensable to animals, phanerogams, and higher algæ, it is not so in the case of bacteria, fungi and lower algæ,"¹ and this is also true of mould fungi (Molisch).

In this sketch many interesting and suggestive details have been omitted, and there is still much new evidence to present, especially with reference to magnesium dissociation, but sufficient has been advanced to make out a case for magnesium infiltration as the causative factor in the production of the "disturbances of nutrition" as exemplified in pellagra. In conclusion, however, it should be distinctly understood that magnesium is not utterly condemned. An effort has been made to show its deleterious effects under diseased conditions, its insidious invasion and apparent harmlessness, owing to its traditional reputation for efficiency, but from a medical viewpoint, with the exception of bacterial growth, calcium is its necessary complement.

¹ Loew, loc. cit.

CHEMIC DEVIATIONS IN THE VASCULAR SYSTEM.

Description—Arterial Changes—Calcareous Degeneration—Hyaline Degeneration — Fatty Degeneration — Fatty Infiltration — Amyloid Degeneration — Atheroma — Endarteritis — Arterio-sclerosis — The Ductless Glands — Mucoid Degeneration — Colloid Degeneration — Arterial Obstruction—Embolus—Thrombus—Blood Clotting—Remedial Measures in Arterio-sclerosis—Blood Pressure—Normal Systolic Pressure (Tabulation).

Description.—Included in the vascular system are the heart, arteries, capillaries, veins and lymphatics, and when affected by chemic deviations which modify the circulation, by diminishing or increasing the blood supply of an organ, or any localized area, the nutrition of that organ or tissue necessarily suffers. Of course, we understand that the arterial blood reaches the veins through the medium of the capillaries, these minute vessels being instrumental in bringing the nutritive elements in contact with the various tissues, this being essential to the maintenance and up-building of the body—secondary assimilation. They are similar in structure to the arteries and veins; hence, any chemic deviation which involves either will affect the capillaries in like manner. In other words, as a rule, all derangements of the vascular system are due to constitutional variations from normal in the body fluids and tissues, including nerve tissue, and it will be shown how magnesium infiltration becomes the chief element, if not the exciting factor, in their production.

In studying this problem it will be profitable to pass in review a number of the most prominent chemic deviations, to the end that the reader may be able to form a clear conception of their nature, and at the same time, learn something of the sequence of the various factors which constitute the morbid complexus.

A word should be added relative to the importance of the lymphatics, not alone as a division of the vascular system, but also as a dominant factor in modifying nutrition, through the influence of these vessels—and glands—upon secondary assimilation—a subject more fully discussed later on in this section.

Arterial Changes.—Whether awake or asleep, the blood is constantly “flowing”—in the arteries at the rate of about twelve inches per second, seven inches per second in the veins and not more than two inches per minute in the capillaries. When the heart action is retarded and the force of the contractions diminished, there is a corresponding effect perceptible upon the circulation, the “blood pressure” being less, and the rapidity of the flow decreased, this change being especially noticeable in jaundice and also in general debility, as well as in other disorders, when the circulation is said to be “sluggish.” As a result of disease or chemic deviations in the vessels, the blood pressure will vary; hence, the value and importance of instruments of precision to measure blood pressure, to the end that the proper remedies may be applied, not only to reduce the pressure, but also to remove the cause.

It would be unwise and premature to digress here for the purpose of discussing the methods available for reducing blood pressure or removing the cause, since these questions can be more intelligently presented in the clinical reports covering all the data. And in this connection, it might be added that didactic teaching, even when *ex cathedra*, has but little weight. Consequently, the writer aims to develop the fundamental basis of his teachings in lines parallel with the modern scheme of utilitarianism.

A word should be added here, however, relative to the lymph-vascular system, a fairly complete circulation in itself, but subsidiary to the blood-vascular system—and dependent upon the latter for its integrity, although its glandular appendages perform an important function in the economy in the production of white blood corpuscles (lymphocytes). For example, a person with a “sluggish” blood

circulation will have a slowly acting lymphatic system, such persons being classed as having a "lymphatic" temperament—but it all depends. A person with a lymphatic temperament will suffer just the same as a person with a mercurial temperament from snake-bite, or any other poison injected under the skin. Such a poison is carried by the lymphatics to the right or left subclavian vein, and thence direct to the heart; coming into contact with the blood, this fluid is disorganized, its oxygen-carrying capacity impaired and its nutritive value destroyed, so that the various organs cease to functionate, and the termination is fatal. The reader should not fail to note here the all-important fact relative to the dominating influence of nerve function—conspicuous by its absence—the poison arrests the functional activity and destroys the physical energy of the protoplasmic cells which make up the nerve structures. Snake-bite might be offered as an illustration of the effects of magnesium infiltration, the former being a flash-light picture, the latter, a two-hour exposure.

Calcareous degeneration arises from the presence of inorganic substances, principally lime and magnesia, in the soft tissues. Affecting the arteries, they lose their elasticity and lack resiliency, thus giving rise to rupture, with extravasation of blood, as in apoplexy, with complete or partial paralysis. Aneurysm, or localized dilatation of the artery, may precede actual rupture, and when occurring inside the cranium, the resulting tumor will produce similar effects. In both instances, we have a complete breaking down of the soft tissues (cerebral softening), and when bacteria gain access, there follows ulceration and possibly systemic infection (septicemia). A "tumor" may also develop as a result of an embolus or thrombus; localized hardening of an artery (arterio-sclerosis), causing obstruction of the circulation and congestion, may also produce symptoms of paralysis. Depending upon the area involved, the paralysis may be confined to one side of the body (hemiplegia), to one arm or one leg, or to the centres of special sense, such as the eye, the ear, or to the sense of smell.

Involving the extremities, these calcareous deposits diminish the blood supply, interfering with innervation and nutrition of the parts, when gangrene follows. While gangrene, due to some local influence, injury, ulcer, pressure or occupation, may affect one extremity alone, it is generally symmetrical—involving both alike (Raynaud's disease), leading to the suspicion that it may be a local manifestation of some constitutional derangement, and a critical study of the malady, from both the scientific and clinical viewpoints, confirms this suspicion, if it does not prove the correctness of the assumption.

Hyaline degeneration affects the fibrous tissue of the artery; it becomes transparent, jelly-like and homogeneous in structure. In other words, it loses its normal (cellular) characteristics and is unable to afford the necessary protection incident to the flow of blood. This is well illustrated in the case of chronic ailments, when the blood supply to the brain is perceptibly diminished, causing the patient to feel drowsy while sitting, although unable to sleep when he lies down. Localized hyaline degeneration of the fibrous tissue would result in distension, dilatation or rupture, followed by the same symptoms as attend calcareous degeneration. And here again, we find that constitutional or systemic changes, similar in character, are also present. Indeed, no elaborate argument is necessary to show that these changes in structure are due to impaired nutrition—malnutrition—a subject considered in detail later on in this article.

Fatty degeneration is characterized by conversion of the protoplasmic cells into fat; there is actual destruction (necrosis), of the units which constitute the tissue. Under the microscope, we find that the muscle fibers have lost their striation; fatty granules are present, and finally, the fibers themselves break down into fatty particles—these changes are attended with more or less marked deviations from normal, always susceptible of demonstration by instruments of precision. While it is possible to have localized fatty degeneration without involvement of the

general system, it is quite out of the question to account for the change, except as a result of defective nutrition, the latter arising from demonstrable chemic deviations.

Fatty infiltration differs materially from fatty degeneration. In the latter, we have a progressive change taking place in the tissues (cell metamorphosis), as previously stated, while in the former there is a deposit of fat from without. Such deposits occur (in protoplasm), in the form of fat droplets which coalesce; the cell nucleus is gradually displaced, and may disappear altogether, the original cell being transformed into a distended sac filled with fat. When such transformation occurs in many adjacent cells constituting the connective tissue the surplus fat is known as adipose tissue. Thus, it will be seen that in both instances, we have cell degeneration, one within, the other taking place by infiltration from without the cell, and the reader must be obtuse, indeed, who does not recognize here the evidences of impaired nutrition.

Amyloid degeneration consists of a peculiar tissue-transformation, giving rise to a wax-like, mahogany-colored albuminous material which gives the usual starch reaction with iodine—dilute Lugol's solution. Amyloid "bodies," resembling starch grains, may be found in the membranes of the brain and other nerve tissue, while amyloid degeneration, as a result of impaired nutrition, is liable to occur in most of the organs of the body. The following description covers the histologic characteristics:

"The amyloid substance appears in the form of irregular homogeneous, translucent, faintly granular areas of fused cells and intercellular substance, affecting chiefly the connective tissue about the capillaries, as in the glomerules of kidney or spleen. The adjacent epithelial cells may show atrophic changes or fatty degeneration. The urinary tubules may contain amyloid casts."

Atheroma is the name applied to an inflammation affecting the middle coat of an artery (mes-arteritis). It involves the blood vessels which supply the arterial walls (vaso vasorum), leading to hardening, fatty degeneration, and

death of the tissues, thus weakening or destroying the vessel walls and favoring rupture, aneurysm or atheromatous ulceration; calcification may also take place, lessening the caliber, diminishing the blood supply, or these small vessels may be entirely occluded—thrombus. Atheroma is chiefly confined to the aged, although its presence may occur prematurely as a result of continued chemic deviation in the body fluids and tissues, coupled with consecutive magnesium infiltration—an every-day occurrence, even without the coincidence of syphilis.

Endarteritis is an inflammation affecting the innermost coat of an artery (intima), and with the exception of the aorta and larger arteries, it is a chronic disorder. Frequently, if not usually, it is secondary or consecutive to the atheromatous changes previously mentioned, and persons so affected generally complain of numbness on awakening; in addition, there are occasional attacks of tingling in the extremities, sharp, darting head-pains, and in advanced age, a persistent, localized pain of this character should be regarded as of grave significance, since it is often the forerunner of thrombus, embolism, aneurysm or apoplexy. When bleeding was in vogue for this condition—and apparently a successful treatment—still, the patient was doomed, because there were no known remedial measures which would either ameliorate the condition or arrest the progress of the disorder. While affording temporary relief, blood-letting exercises no influence whatever upon the chemic deviation. Consequently, the patient was without hope, and awaited the inevitable, simply because the medical profession had failed to discover the underlying cause in malnutrition—the acidity coupled with magnesium infiltration. Bearing in mind that the lymphatics are intimately concerned in promoting the absorption of waste material from all serous membranes, including the heart cavities and pericardium, the joints and the peritoneum, as well as the brain, we can readily trace endarteritis to lymph-stasis—proof of this being found in the prompt relief afforded by stimulation of the lymph-vascular apparatus, by means of alkalies, which

augment the functional activity of the glands, increasing their physical energies.

Arterio-sclerosis, or hardening of the arteries, affects chiefly the smaller vessels; it is characterized by thickening of the external (adventitia), as well as the internal coat (intima); hence, the elasticity is notably diminished, leading to increased arterial pressure. The condition is easily recognized by an examination of the pulse at the wrist, which is small, thready, and in advanced age, the increased tension gives the sensation of a whip-cord. Associated with, or as a result of sclerosis, we find the temporal arteries prominent and tortuous; the extremities (hands and feet) are shrunken, the veins distended, or even dilated, and not infrequently, there is numbness (Raynaud's disease), or possibly gangrene.

The general deterioration attending the use of alcoholic stimulants has long been recognized. Alcohol causes degenerative changes involving the muscular system, and especially the heart muscle; in chronic alcoholics, we also find degenerative changes affecting the entire nervous mechanism, and especially the brain centers, precipitating delirium tremens and often ending in insanity; the effect upon the blood vessels is particularly noticeable—hardening of the arteries, with increased tension, dilatation of the veins and capillaries, engorgement of the lymphatics, kidney disease, and general impairment of nutrition, so that acute diseases, such as pneumonia, influenza and typhoid fever, are almost certainly fatal. Notwithstanding the associated clinical facts—degenerative changes in the muscular and nervous systems, coupled with kidney disorders and arterio-sclerosis—each has been considered as an entity and treated accordingly, instead of regarding them as separate links of a chain, the causative factor being found in the nerve structures themselves—in the form of abnormal or factitious inorganic deposits which impair, hinder or destroy their capacity for the uninterrupted transmission of impulses.

It will be readily admitted that this is a plausible deduction, because we understand how alcohol has the effect of hardening animal tissue, including nerve tissue; following

up this line of inquiry, we can see how hardening of nerve tissue must be attended with more or less inflammatory reaction and disorganization of the organic colloids, thus permitting chemic transformation through the action of magnesium oxide. Hence, no treatment of kidney disorders and arterio-sclerosis, or the degenerative changes involving either the muscular or nervous systems in chronic alcoholism can be expected to afford more than temporary relief, unless it includes those measures which have proven successful in promoting magnesium dissociation.

Apropos of this novel contention it will be in order to recall Harvey's dictum (1621) "*omne vivum ex ovo*," now referred to as a "prevision of genius," because the mammalian ovum was not demonstrated by Von Baer for more than two hundred years (1827). In the present instance, it is not necessary to draw upon the imagination, since the evidence, in the shape of clinical and scientific facts, is ample and conclusive.

Reference should be made here to the effect of alcoholic stimulants upon the ductless glands, which not only confirms the working hypothesis of magnesium infiltration, but also goes to show that the position is well taken, that all these degenerative changes arise from, and are traceable to, impairment of nerve function. Hence, the utter folly of assuming or claiming that arterio-sclerosis is "always caused by chronic disease of the kidneys," when it can be shown that kidney disease is a localized manifestation of the systemic chemic deviation. Proof of this is to be found in the immediate and marked relief which follows when the usual medical measures are adopted to restore the normal alkalescence of the body fluids and tissues—conjointly with remedies to correct the effects of chemic deviation.

Necessarily, therefore, the kidneys are the first to suffer, their delicate structures being disorganized by the constant secretion of the highly acid urine—a much more acceptable, and withal, a more scientific explanation than that usually advanced, as follows: "Kidney disease causes a poisoning of the blood, and this acts on the walls of the arteries of

the entire system, bringing about inflammatory changes." It is the magnesium infiltration which interferes with the normal function of the cells—when the body fluids lose their normal alkalescence.

The Ductless Glands.—It has been found that alcohol has a pronounced effect upon the thyroid gland, first causing stimulation, and later, producing exhaustion, so that in chronic alcoholism with thyroid degeneration, enormous quantities may be taken daily without producing the usual symptoms of intoxication. In such instances, we assume that the alcohol produces the usual hardening effect upon the colloid structure of the gland, and this in turn, favors chemic transformation through the action of magnesium oxide—thus destroying its functional activity. Not only in chronic alcoholism do we observe this anomaly, but also in Graves' disease (goiter), in myxedema, and in diabetes, where degenerative changes in the thyroid gland are well marked and generally progressive in character. Besides, we know that in all acute diseases, there is a gradual exhaustion of the thyroid—pneumonia, typhoid and scarlet fever—when the temperature becomes subnormal; the heart is said to be embarrassed and vitality at such a low ebb that alcohol alone must be administered as a diffusible stimulant, although patients so treated exhibit none of the symptoms characteristic of intoxication. While this is the routine method, and traditional, it is not altogether good practice, because it is harmful in every case, and may even produce fatal results. Therefore, instead of regarding alcohol as the "sheet anchor," as one of my professional correspondents puts it, we should endeavor to conserve the functional activity of the gland—by neutralizing acid excess, and by adopting the necessary measures to effect magnesium dissociation.

While no reference is made here to the effects of alcohol upon either the adrenals, or the pituitary body—both ductless glands with an internal secretion, like the thyroid, and in direct physiologic relation with it—there is no apparent necessity for further elaboration here, since they are similar

in structure and function. This subject is more fully discussed under the head of Goiter, *q. v.*

If we assume, as claimed by recent investigators, that arterio-sclerosis is caused by some toxic agent, which is responsible for the degenerative changes in the blood vessels, as previously described, and bear in mind that these, or identical changes, can be produced artificially by the injection of adrenal extract, the problem is greatly simplified—because, we know that emotion, fear, excitement or intense mental activity will cause adrenal secretion to appear in the blood stream. The deduction is warranted, therefore, that atheroma, arterio-sclerosis and increased arterial tension are brought about through some occult influence of the adrenal secretion upon the nerve structures, rather than that these degenerative changes are due to toxic agents. This is a logical deduction and proves the correctness of the working hypothesis, atheroma, arterio-sclerosis and increased arterial tension being readily amenable to chemic treatment or medication as outlined:

(1) To overcome or antidote simple replacement by the employment of calcium salts to promote magnesium dissociation—according to the law of mass action;

(2) To correct or counteract chemic transformation (the chemic union of magnesium oxide with the organic colloids of the nerve structures), by means of chemic substances to dissolve or promote absorption of the organic material that holds together the inflammatory mass acting as an obstruction to the transmission of nerve impulses;

(3) To resolve or promote disintegration of the inflammatory products where magnesium united with calcium constitutes the barrier.

Success or failure in accomplishing these objects will depend almost entirely upon the functional integrity of the cellular structures, since all vital activities depend upon the ultimate cell.

Again, we must not overlook the antagonism which exists

between thyroid secretion and that of the adrenals. Thus, removal of the gland is followed by a peculiar, depraved condition of metabolism called *cachexia strumipriva*, closely allied to myxedema, while impairment of the thyroid function is followed by atheromatous changes and increased arterial tension. The latter is frequently pronounced in diabetes, syphilis, alcoholism, and also after acute infectious diseases, in all of which we find impairment of the thyroid function—in consequence of magnesium infiltration (?). The clinical evidence is readily secured by the administration of calcium salts to promote magnesium dissociation—when the atheroma and arterio-sclerosis together with the symptoms of toxic agents disappear, unless the disorder has persisted so long that the colloid structure of the gland has been radically changed or permanently destroyed by atrophy, or by connective tissue taking its place.

In this connection it should also be stated that various toxic substances, organic or inorganic, such as tobacco and lead, do cause enlargement or hypertrophy of the adrenals, but the writer is under the impression that laboratory studies confined to an investigation of the physical and chemic effects of magnesium salts upon the ductless glands and upon the nerve structures will ultimately confirm the claims set forth—when medical treatment will be marvelously simplified, because these magnesium deposits could not possibly occur were the normal reactions of the body fluids maintained. Moreover, the symptoms and physical deterioration can only be caused to disappear by means of treatment conducted for the sole purpose of correcting the chemic deviation, as previously stated.

While arterio-sclerosis is regarded as peculiarly a disease of advanced age, modern life undoubtedly causes its premature appearance—ample evidence of this being found in the daily prints. Usually charged to worry, nerve-strain, overwork, and such like, these patients seem resigned to fate, content to live in a band-box when, as a matter of fact, they are suffering from a “habit” of the system arising from chemic deviations, progressive in character but not incurable.

Mucoid degeneration is said to take place when the cells and also the intercellular substance are converted into mucin, or animal gum. It is a compound of a proteid with a carbohydrate, the characteristic substance in mucus; found also in saliva, bile, mucous tissue, synovial fluid, etc., and on decomposition yields leucin and tyrosin, waste products. A note should be added to the effect that mucin is insoluble in water and that it is precipitated by alcohol and acetic acid; hence, its untoward effects in disorders of the liver and in chronic rheumatism, especially in the case of alcoholics and those suffering from lymph-stasis and acid excess incident to the indigestions.

Colloid degeneration is similar to mucoid degeneration, the cells being converted into a colloid, or glue-like substance; it is non-crystallizable, and differs from mucin, being soluble, and does not give the same reactions. Like other colloids, it combines chemically with magnesium oxide (calcined magnesia), in alkaline solution, and thus colloid degeneration becomes a factor of special significance in all cases where we have to contend with progressive changes in the circulatory apparatus. That is to say, the various arterial changes described are always associated with constitutional deviations, similar in kind, but varying in degree, and in general, if not invariably, the cause may be traced to abnormal deposits of magnesium, by replacement, chemic transformation, or united with calcium.

Arterial Obstruction.—In addition to the foregoing changes, all of which lead to arterial obstruction as a result of constitutional derangements arising from chemic deviations in the body fluids and tissues, certain accidents are liable to occur, which also interfere with the flow of blood and give rise to the usual symptoms.

Embolus.—When a foreign body—a blood-clot, or some other substance—finds lodgment in the artery, it is called an embolus, the disordered condition being known as embolism. Should the embolus involve an end artery, such as the coronary arteries, or one of the arteries of an extremity, the blood supply of the distal area is arrested, when the tissues

undergo degenerative and inflammatory changes. The area thus affected becomes an "infarct;" its nutrition being arrested, death of the tissues follows, usually in the form of dry or moist gangrene.

Thrombus.—A thrombus differs from an embolus, the clot being formed within the blood vessel—at the point of obstruction or in the heart itself. A thrombus, or the condition known as thrombosis, arises from an abnormal condition of the blood, coupled with some preëxistent deviation in the blood vessels—atheroma, calcareous, hyaline, amyloid or fatty degeneration, or hardening. This condition of the artery, however, is not the causative factor; rather, it is a predisposing factor, coincident with the constitutional susceptibility arising from certain demonstrable chemic deviations in the blood. Thus, under normal conditions as to alkalinity, the blood does not clot in the arteries. In other words, disintegration is necessary.

Blood Clotting.—As soon as the blood escapes from a vessel and is exposed to the air, disorganization of the white blood corpuscles releases the fibrin ferment,¹ which acts upon fibrinogen to produce fibrin. This phenomenon (blood-clotting) is a conservative process, an effort at reorganization on the part of nature, fibrin being insoluble in water and ether. It occurs in the form of delicate, closely packed, microscopic, doubly refractive fibrils, entangling the blood corpuscles as in a spider's web, and constitutes about 0.2 per cent. of the blood. Fibrinogen is a native proteid, found in blood plasma, serous transudations, etc., and one of the chief elements in the formation of fibrin, as previously stated.

Remedial Measures.—Antecedent to embolism and thrombosis, together with the morbid complexus finally resulting in arterial obstruction from blood-clot, atheroma and arterio-sclerosis, we may discover various deviations from normal in the circulatory apparatus which, when properly

¹ Fibrin ferment is obtainable from blood serum after clotting has occurred. It does not exist in living, circulating blood, and is destroyed by heating to 70° F.

interpreted, enable us to anticipate and prevent the untoward effects described. First, in order, we must secure and maintain as far as possible a normal alkalescence of the body fluids—to the end that nutrition shall be reëstablished. And in this connection we must not lose sight of the untoward effects of a diminished alkalinity of the blood upon the nervous mechanism—because, as will be shown, defective innervation is responsible for the appearance of all the degenerative changes mentioned, and also for their persistence. Nothing in the way of permanent improvement is possible until this object has been attained—it is essential and fundamental, and withal, scientific.

Next in order, we must consider the remedial measures necessary and available for correcting or overcoming the effects of defective innervation—in short, the degenerative changes passed in review—and this opens up a fruitful field for exploration and discussion. Following the lines of routine and tradition, it would be politic, if not sagacious and specious, to fall in with the generally accepted views relating to the advantages of the ordinary normal nerve stimuli, electric, thermic, mechanic and chemic. In view of the fact, however, that chemic deviation is the paramount, essential and dominating factor, it will be the part of wisdom to consider briefly the arguments advanced in favor of the others. Thus, electric stimulus, by increasing the conductivity of the tissues, augments tissue change and favors the elimination of waste products. Judiciously employed, it will even break down and promote the absorption of abnormal growths, its action in the form of the x -ray being similar, if not identical, with the effects produced by radium and other radio-active substances. Furthermore, like other normal nerve stimuli, electricity restores the alkalinity of the tissues, a scientific fact which will account for the oft-times magic effects attending the employment of galvanism or static electricity. Permanent effects are secured only through the stability of alkalescence, although there are exceptional cases; hence, the necessity for continuous treatment. Consequently, the advantages of electric

stimuli, except as an adjuvant, in the class of cases under consideration, must be regarded as palliative rather than curative.

When mercury fails to produce the anticipated effects in arterio-sclerosis, the medical attendant resorts to potassium iodide, frequently employing massive doses, even to the point of tolerance, without the least conception of the exact object to be attained. Now, shooting for general results is almost invariably harmful to the patient, and it is a pertinent fact that many deaths are hastened by such treatment.

A brief study of this question will suffice to convince the most skeptical—and it is an extremely simple matter to make a clinical demonstration, in locomotor ataxia, for example. In this instance, hardening of the nerve structures seems to be the paramount factor, and overshadows the coincident arterio-sclerosis, which interferes with nutrition by diminishing the blood supply. Here we are dealing with an inflammatory reaction arising from systemic invasion by the *spirocheta pallida*. Not only is the circulation disordered, but innervation is impaired in consequence of the progressive hardening.

To promote resolution in such cases, mercurials have long been regarded as absolutely necessary, and therefore, essential; when they fail, the “alterative” effects of iodine are sought, both being employed on general principles—empirically—and actually, without scientific precision—hence, without efficiency. That this line of treatment accomplishes fairly satisfactory results in some cases is not denied, but this is due rather to the physical condition of the patient than to the skill of the medical attendant—or the efficacy of the medicaments employed.

The above statement will be comprehensible when we consider the effects of mercury and iodine upon the tissues—actually, the body cells. Mercury, in medicinal doses, depletes the lime content, notably of the bones, the long bones being especially susceptible; they become soft and are easily broken, union being slow and oft-times impossible.

Besides, there are other important changes taking place which modify nutrition. Frequently, if not usually, elimination of the discarded lime by the usual channel, the bowels, is deflected or interrupted, the tendency being to accumulate in the structures of the kidney, causing dropsy and calcareous degeneration. There is also a tendency to "gravel" and stone in the bladder. When the liver is involved, we have gall-stones, and occasionally lithiasis, or calculus formation in the intestinal tract. And even the lungs do not escape, a pointer for the advocates of mercurial injections in tuberculosis. Apparently, a most promising method, since it seems to conform with nature in restoring the depleted lime (calcium), to the pulmonary tissues, but it must evidently render the patient utterly bankrupt in respect to health.

Iodine is destructive and actively poisonous to animal tissue, but in medicinal doses it performs a valuable function as an alterative, and when employed with discrimination in syphilis, the effects are immediate and marked. Unlike mercury, it does not deplete the lime content of the cells, but it can accomplish little in promoting resolution without the conjoint use of calcium. Hence, its failure to produce uniformly satisfactory results.

From what has been said, the reader must infer that something is lacking in our conception of the treatment of arterio-sclerosis as it occurs in locomotor ataxia, a *lacuna* which has hitherto escaped detection, or an unbridged *hiatus* which renders progress difficult. Indeed, it is not too much to say that no advance in medical practice is possible until the working hypothesis of magnesium infiltration is accepted and applied at the bed-side—because it is constructive, efficient and scientific.

Associated with arterio-sclerosis, we find deviations in both function and structure, the former being classed as physiologic, the latter as chemic, although in most instances, both arise from the invasion of syphilitic infection and are merely the local and incidental manifestations of constitutional derangement. Furthermore, it has been shown that

medical treatment is faulty, because based upon mistaken premises, and under certain conditions, serves but to aggravate the malady and lessen the chances of recovery. Whether treatment is conducted in accordance with the doctrine, "*contraria contrariis*," or "*similia similibus*," the stimulus (irritation), follows the lines of invasion, causing further cell exhaustion, instead of recuperation and reconstruction to augment resistance.

Now, while locomotor ataxia may be regarded as an exaggerated illustration of the complications incident to arterio-sclerosis, it is none the less typical. In fact, the conditions characteristic of locomotor ataxia may develop independently of syphilitic infection—and the same routine treatment carried out is almost invariably as uncertain and always as unsatisfactory, convincing proof that the medical profession has not yet fathomed the mystery of the chemic problem in nutrition.

An apt illustration of this is to be found in the case of B., upwards of forty, always a hard working man, enjoying remarkably good health. He was taken ill about mid-August—probably autumnal catarrh, and popularly known as hay-fever—and was treated for a time for tuberculosis, owing to the cough and profuse expectoration. Later, the catarrhal condition shifted to the stomach, the lungs and bronchial tubes having cleared up.

This patient was first seen about the middle of October, at which time he had been confined to bed for a period of two months. The skin was sallow, almost jaundiced, the pulse small and hard and much below normal in frequency, while the heart action was labored; the abdomen was much distended with gas, there was no desire for food, the bowels were obstinately constipated together with profound despondency, the latter condition being brought about partly owing to constant nausea. To this long list of ailments should be added persistent numbness of the hands and feet, all of which was readily accounted for by testing the salivary and cutaneous reactions, both being intensely acid.

Treatment was conducted according to the general plan previously outlined—to restore the digestive capacity and neutralize acid excess, and as a result, the patient had but one subsequent attack of nausea and vomiting—early one morning when he had turned to lie on his left side during sleep. In the course of a couple of weeks he was up and around and able to do a little work, but the numbness became progressive, the stiffness involved the arms and legs, so that he had to use crutches.

It should be stated here that the patient received only a part of the treatment as outlined—he *did not have* treatment to promote magnesium dissociation, and in consequence, the magnesium infiltration became progressive—involving both the nerve structures and the arteries. It seems a fateful paradox, but the prompt relief afforded this patient was the means of his undoing. Over the telephone, he asked to have the medicine renewed—an unreasonable request under the circumstances—and he failed to call on me until two months later. The patient had taken on flesh, over twenty-five pounds, the skin was sallow, almost jaundiced, and he was so seriously crippled that he could neither dress nor undress himself—he could not even put on his gloves, and suffered intensely from the cold weather.

Treatment, conducted to promote magnesium dissociation, enabled him to substitute a cane for the crutches in less than a week and everything looked promising, but unfortunately, I only saw him once afterwards, an acute attack of indigestion requiring the attendance of a local physician. Later, I learned, a consultation was held, when it was found the patient had anemia, but this failed to respond to treatment, and he died a few weeks later.

This case is exceptionally interesting and instructive, because we can trace the magnesium infiltration as the dominant factor—indigestion and acid excess coincident to the attack of hay-fever and consecutive bronchial catarrh; then followed metastasis—catarrh of the stomach with impairment of the liver function, and finally, progressive arterio-sclerosis, the anemia being merely incidental. It

confirms the preceding deductions that the local manifestations or symptoms are merely evidences of systemic involvement, while the results of treatment show the exact nature of the chemic deviation.

Blood Pressure.—Under normal conditions, varying with age, the blood pressure—in the brachial artery—is fairly uniform, although a reasonable allowance, ten per cent., may be made for “nervous” patients, because, as has been pointed out, emotion or excitement is liable to act as a stimulus to the adrenals, thereby increasing their functional activity. However, we must also consider the antagonistic effect of the thyroid secretion as a regulator, the peculiar “nervous” sensation in the throat when a person is excited being well known. Again, chemic deviations affecting either structure will modify the reading or tracing, since it is extremely unlikely that both glands should be involved to an equal extent, so that the value of the sphygmograph, in Graves’ disease, myxedema, diabetes mellitus and arteriosclerosis is relative rather than absolute. Compensatory or reflex stimulation to maintain the equilibrium of the circulation is an assumption based solely upon physiologic grounds. When, however, we have to deal with chemic changes in the glandular structures themselves, progressive in character, the sophistry of the argument becomes apparent, such chemic deviations being, for all practical purposes, equivalent to organic changes.

Clinical evidence is not wanting to demonstrate the correctness of these deductions. Thus, we can always secure a favorable impression upon the symptoms of these disorders, and not infrequently arrest their progress, by simply restoring the normal alkalescence of the body fluids and tissues. Arterial tension is reduced, normal secretions reëstablished, thus favoring elimination, while both the primary and secondary assimilation are improved—because of the favorable influence upon innervation. Adopting in addition the usual measures requisite to promote magnesium dissociation, all the unfavorable symptoms immediately show a disposition to subside—unless degenerative

changes have entirely destroyed the integrity of the cellular structures.

Normal Systolic Pressure.—The following tabulation shows approximately the normal systolic blood pressure at different ages in males—that of females is about ten millimeters less—the test being made when the patient is in the recumbent posture. The normal pulse pressure varies from 20 to 40 mm., and is notably modified by the degenerative changes taking place in the arteries.

NORMAL SYSTOLIC PRESSURE.

18 to 30 years of age	110 to 140 mm.
30 to 40 years of age	115 to 145 mm.
40 to 50 years of age	120 to 150 mm.
50 to 60 years of age	125 to 155 mm.
60 to 70 years of age	132 to 165 mm.

Even to the uninitiated, the danger of high blood pressure must be apparent, and especially so in the case of advanced age, when the arteries are brittle and have lost their elasticity. When we consider the modern routine treatment of such cases, strychnine, digitalis and nitroglycerin (the usual heart stimulants), one can readily understand that a favorable prognosis is out of the question, since the logical results of medication lead to embarrassment of the heart. Hence, the increasing number of fatalities, from so-called heart failure, such accidents being more frequently due to medication than to disease. Any mechanical engineer of ordinary ability knows the dangers of carrying two hundred pounds steam-pressure in an old boiler with rusty flues, when it was only tested for one hundred and sixty when new. He knows, too, full well, that increased steam-pressure has no tendency to improve the mechanism of the boiler, or the strength of the flues, and must content himself with the power derived at the legitimate gauge, or precipitate a catastrophe. Happily, in the human economy, the arteries corresponding with the boiler flues are composed of living, vital cells, increased tension or pressure being due to factitious (adventitious) deposits, inorganic in character, which

in many instances, may be more or less completely dissolved, thus relieving tension, and that too, without in the least embarrassing the action of the heart. On the contrary, as previously indicated, when resistance disappears, normal functions are reëstablished, so that the control of abnormal blood pressure, whether high or low, is a chemic rather than a physiologic problem.

CHEMIC DEVIATIONS IN THE VASCULAR SYSTEM—CONTINUED.

The Capillaries — Congestion — Edema and Nephritis — The Veins — Varicose Veins — Illustrative Cases — Phlebitis — Milk-leg — The Lymphatics — The Lymphatic Glands — Appendicitis — The Rational Plan of Treatment — Osmotic Pressure and Osmosis.

CONTINUING our study of the chemic deviations in the circulatory apparatus, we have to consider the effects upon the veins and capillaries, these vessels being continuous with the arteries. While the flow of blood under normal conditions varies with the force of the heart contractions, there are other factors equally important to secure its proper distribution. First in order comes the vasomotor nerves, which regulate or control the caliber of the vessels, arteries, veins and capillaries, and the evidence is in favor of the belief that the adrenal secretion enacts the rôle of a physiologic stimulus to the sympathetic nervous system, or vasomotor nerves, since it is now well known that its frequent or continuous employment ends in arterio-sclerosis. Thus, we lose the advantage of the normal resiliency of the arterial walls, the second factor in promoting the equable distribution of the blood. Add to this the alternate contractions and relaxation of the involuntary muscles, the action of the skeletal and respiratory muscles, glandular activity and posture, and bearing constantly in mind that these diverse activities are all conducted under pressure—osmotic pressure—the problem becomes more complex as we proceed. It would, indeed, be impossible to estimate with any degree of accuracy the relative importance of these different factors, or even comprehend their combined significance were it not for the light thrown upon the screen by our knowledge of osmosis—the diffusion of liquids through animal and vegetable membranes.

The Capillaries.—When blood is passing through the capillaries, one corpuscle at a time at the rate of two inches per minute—under pressure—there takes place more or less diffusion or transudation, so that the “tissues,” really the cells, are supplied with oxygen, along with nutritive elements, giving up carbon dioxide and other waste products, so that the venous blood is much darker and less fluid than arterial blood. This is the respiratory function of the tissues, or tissue change, and its integrity and maintenance depend largely upon osmotic pressure, a subject more fully discussed later on.

An excellent illustration of the capillary flow is seen in the case of chronic alcoholics—the face is dark, red or mottled, but on close inspection we find a distinct outline of the capillaries, those on the arterial side being bright red in color, those on the venous side, dark. This not only shows the effect of tissue respiration on the blood, but also the “sluggish” nature of the circulation throughout the body as a result of alcoholic stimulants. Besides, we must consider the arrested tissue change as a factor in favoring deposits of magnesia, since we know that chronic alcoholism is always an exciting factor in the production of atheroma, arterio-sclerosis and other degenerative changes in the arteries. The same is true of the capillaries and veins; hence, the same rule applies to the tissues in general, because the colloids which enter into the composition of protoplasm forming the blood vessels differ in no essential respect from those which constitute the general tissues, connective, nervous and muscular.¹

¹ Chemists recognize two kinds of colloids—emulsion and suspension colloids. Emulsion colloids combine two liquid phases; they are viscous, gelatinizing, not readily coagulated by salts and hydrolytic, such as gelatin, starch, dextrin, albumin, etc. Suspension colloids include a solid and also a liquid phase, non-viscous, non-gelatinizing, hydrolytic and readily coagulated by salts, such as colloidal solutions of metals and hemoglobin. Hence, in studying the disorders of nutrition incident to tissue change, or tissue respiration, we must bear in mind that the substance of cells consists of a mixture of different colloids and that these colloids possess peculiar physical and chemical properties.

This will explain in part, at least, the nature of the chemic deviations responsible for such degenerative changes, such as atheroma, hyaline, fatty, amyloid, mucoid and colloid degeneration. At the same time, it is a step forward in accounting for arterial obstruction from embolus, thrombus and from arterio-sclerosis and calcareous degeneration.

Congestion.—Congestion of the tissues centers around the capillaries. When the arterial capillaries are involved, as in beginning pneumonia, the congestion is said to be active; in the case of asthma, with distended veins and labored breathing, the congestion is said to be passive. Now, whatever influence or effect may arise from bacterial invasion in either of these instances, it must be apparent that infection alone is not the sole cause. Thus, a person in robust health may have active congestion of the lungs following exposure, or from an injury, while another is liable to an asthmatic seizure from various causes, acute indigestion, a whiff of some particular odor, or the slight displacement of a vertebræ involving the pulmonary nerve supply. In fact, the final analysis shows that defective innervation is the pivot upon which hinges all disorders characterized by congestion—in many, if not in most instances, when rightly interpreted, a conservative process.

A brief reference here to certain peculiarities connected with tissue respiration would, perhaps, lessen the acerbity of the foregoing deduction. Immediately congestion begins, the oxygen supply is diminished, while the production of carbon dioxide continues—acting as an anesthetic—and besides, other waste products accumulate to further benumb sensation. The protoplasmic cells are literally suffocated for lack of oxygen, there is alteration in the colloids and arrest or retardation of imbibition (absorption).

It would be interesting to discuss here various inherent or vegetative functions, such as normal resistance due to the defensive proteids, leucocytosis, symbiosis, osmotic pressure and surface energy, but any criticism will be fully covered by a brief reference to the immediate and marked effect of acids and alkalies. For example, an ox or

sheep eye placed in acidulated water will swell until it bursts the sclera; the addition of an alkali (citrates), will arrest the swelling—and lessen it. Gelatin and fibrin are affected in the same manner. Professor Martin H. Fischer has recently taken advantage of this chemico-physiologic principle in the treatment of glaucoma. He first demonstrated the absence of capillary pressure as a factor—by placing a ligature on a frog's leg above the knee, causing complete obstruction of the circulation, with edema, followed with the formation of blebs under the skin, a condition simulating glaucoma. For treatment, he injected, subconjunctively, a $\frac{1}{8}$ to $\frac{1}{6}$ molecular solution (approximately 4 to 5 per cent.), sodium citrate, which relieved the tension and kept it low for several days.

Applying this principle in the case of congestion, active or passive, the effects are little short of marvelous, and since all disorders of nutrition are attended with diminished alkalescence, why not make this a dominant factor in the treatment of disease? And when it is understood—and believed—how acid excess leads to disordered innervation from chemic deviations of the inorganic proximate principles, a Doric column is added to the perspective of the medical superstructure.

Edema and Nephritis.—Dr. Fischer, as a result of his laboratory work relating to the nature, cause and relief of *edema and nephritis*, presents the following deductions as “*The Argument*.”

1. The amount of water found under normal or abnormal circumstances in any cell or tissue, including blood and lymph, is determined by the colloids contained in it, and by the state in which the colloids exist.

2. A state of edema is induced whenever, in the presence of an adequate supply of water, the capacity of the tissue colloids for holding water is increased above that which we choose to call normal. An important, if not the most important cause, for such an increased hydration capacity is to be found in an abnormal production or accumulation of acids in the

tissues, but we must also consider the possibilities of explaining it partly through substances which affect colloids in a way similar to acids, or through the conversion of colloids having little hydration capacity into such as have a greater capacity.

3. All the changes that characterize nephritis are colloid-chemic in nature, and are due to a common cause, namely, the abnormal production or accumulation of acids and substances that act like acids in the tissues of the kidney. To their action upon the colloidal structures that compose the kidney are due the albuminuria, the morphologic changes in the kidney, the associated production of casts, the quantitative variations in the water and the dissolved substances secreted, etc.

4. To avoid a threatened nephritis, or to relieve an established non-atrophic nephritis, we must avoid as far as possible every condition favoring abnormal production or accumulation of acids in the kidney. Alkali is indicated to neutralize the acids present; salts, including NaCl (sodium chloride), to reduce the edema of the kidney and other organs: and water, day and night, in order to have free water available for urinary secretion.

The Veins.—Associated with the degenerative changes described, the veins are subject to various changes, distension, dilatation (varicosis), and rupture; a blood clot may lead to obstruction, followed by "inflammation," and in case bacteria find access to the affected area, ulceration occurs. The sepsis thus arising gives rise to general infection or septicemia, characterized by fever, or elevation of temperature, accelerated pulse-rate and respiration, with arrest of the secretions and more or less delirium, the poison or sepsis being distributed through the medium of the blood, and also the lymphatics. Fortunately, nature has provided against such contingencies under normal conditions, in addition to leucocytosis, so that the system is measurably fortified against bacterial invasion.

Distension of the veins always shows relaxation of the vasomotor nerves, a familiar example is seen in the case of

blushing—due to psychic stimulus—and when distension is long continued, the vessels become dilated. The rapidity of flow is diminished, carbon dioxide and other waste products accumulate in the tissues to hinder tissue change. This pressure upon the nerves, motor, sensory and trophic, may involve adjacent tissues to the extent of causing local congestion. We have an example of this following injury, or the application of irritants, such as fly-blister. Congestions of this character are generally amenable to local treatment in the form of dry or moist heat, but dilated veins (varicose veins), require constitutional treatment, a disorder, by the way, intimately connected with our present study of chemic deviations in the vascular system.

Varicose Veins.—A serious mistake occurs when it is assumed that a varicose vein is an entity and will respond to local, astringent applications, such as hamamelis, or pressure in the form of an elastic bandage or stocking, since it can be shown beyond question that it is merely a local manifestation of constitutional derangement—and magnesium infiltration is the exciting factor responsible for its production. Internal medication, usually in the form of astringents, which are supposed to act upon the blood, are worse than useless, because they exert a baneful effect upon its nutritive value, and besides, the astringent effect upon the involved tissues is well calculated to produce further deterioration—and from which the nerves do not escape. The vast number of valetudinarians, victims of the elastic stocking craze, is a reproach to medical science, because constitutional treatment in the early stage will cause the disappearance or subsidence of varicose veins.

Illustrative Cases.—The following case records will serve to confirm and illustrate the foregoing statement: Mr. B., aged 32, engaged in office work and traveling, has worn an elastic stocking for the relief of varicose veins during the past seven years. Apparently in robust health, with no history of previous illness, he has been unable to dispense with the support, summer or winter. Treatment consisted in restoring the

normal alkalinity of the blood—by means of alkaline-saline medication—along with the hepatin tablet to improve the digestive capacity and stimulate the liver function, and as a result, the patient discarded the support in less than ten days.

Some years ago, a gentleman whom I had previously treated, requested me to prescribe for his wife by mail. Age about 45, he said she had been confined to bed for two months with varicose veins, the feet being very much swollen and painful. Although convalescent and able to sit up, the patient could not go about the house, as walking or standing produced great pain.

Medication and directions, the same as given in the previous case, arrived on the day the family was starting for Jamestown Exposition, the medical attendant having advised sea-air in hopes of benefiting the patient. Treatment was begun at once on arrival, and in the course of two weeks she had made complete recovery and could out-walk any of the party when visiting the grounds.

Phlebitis.—This is a technical term for inflammation affecting a vein, and occurs under numerous and varying conditions—without as well as with septic infection. Thus, we must admit a distinct line of demarcation between simple and infective inflammation; hence, our inquiry as to the probable causative factor responsible for phlebitis in the following instances:

Gouty phlebitis is said to be dependent on the presence of gout. But gout is a disorder arising from chemic deviations incident to acid excess, with deposits, principally urate of soda, in and around the joints—and these results are not possible with normal alkalescence of the body fluids and tissues. In other words, gouty phlebitis will not develop under normal conditions in respect to chemic reactions.

When we compare simple with suppurative phlebitis, the contrast is well marked. The former is local and circumscribed and usually of short duration; the latter is serious, owing to the dangers arising from the distribution of septic

infection (emboli), to distant organs, but even here the severity of infection may be measurably lessened and a fatal termination avoided, by restoring the normal anti-septic properties of the blood, through alkalescence.

The practical value of this suggestion is easy of demonstration, for example, in the case of varicose phlebitis, inflammation of a varicose vein, where we have to deal with the tissue relaxation incident to acid excess, with consecutive magnesium infiltration.

Milk-leg, phlegmasia alba dolens, is due to septic infection after labor. It may begin at the ankle and extend upward, or in the groin, and follow a downward course. Obstruction or thrombosis of the veins of the thigh is the most common as well as the most dangerous, but involvement of the connective tissues and lymphatics of the leg is always attended with a lingering convalescence, not entirely free from danger—simply because the medical profession has thus far failed to recognize and understand the chemic deviation as the causative factor.

The Lymphatics.—The lymphatics include both vessels or tubes, and glands, lymph glands, and perform important functions in nutrition. The circulation within the system consists of lymph and chyle, and it might be regarded as tributary to the blood-vascular system, because the lymph channels are maintained in normal condition through the integrity of the arterial blood supply in connection with osmotic pressure. The following description is not too technical for the general reader:

“They arise in the tissues and terminate by joining the venous system, so that their contained fluid flows toward the heart. They resemble veins in having a course from periphery to center; in possessing valves, which are generally two in number and semilunar in shape; in being divided into a superficial and a deep set—the superficial lymphatics being situated, like the superficial veins, in the subcutaneous tissue, the deep lymphatics accompanying the arteries and deep veins. Lymphatics differ, however, from veins in possessing in their course

glandular enlargements, in having thinner coats, in being almost uniform in size, and not uniting into larger vessels as they pass onward in their course. As a rule, they are like fine threads, and their main trunk, the thoracic duct, is not bigger than a crow-quill."

Special attention should be directed to the lacteal or chyle vessels, owing to their peculiar function as compared with the lymph vessels proper, together with their origin in the intestinal villi, by which they become responsible for the absorption and transmission of poisons from the intestinal tract—in the case of intestinal indigestion, ptomain poisoning and typhoid fever. The lacteals discharge the chyle directly into the thoracic duct at the point marked by a dilatation of the duct—*receptaculum chyli*—thence it is carried along with the lymph proper to the left subclavian vein, where it unites with the blood and thus enters the general circulation. The lymph vessels on the right side of the body above the diaphragm unite to form the right lymphatic duct, which empties into the right subclavian vein.

The lymph vessels proper are also responsible for the absorption and distribution of poisons through the medium of the circulation, as must be apparent when we recall their intimate connection with serous structures, such as the pleuræ, one investing each lung and lining the interior of the corresponding part of the chest cavity; the pericardium which invests the heart, and lines the bag in which the heart is contained; the peritoneum, which invests the abdominal organs, and lines the abdominal cavity; the arachnoid membrane, which invests the brain and spinal cord, enclosing these important organs; and the free, smooth surfaces of the synovial membranes which go to make up the joints. The serous and synovial membranes cover surfaces of parts which move on each other, so that the lymph or serum becomes an important factor in permitting freedom of movement, by diminishing friction. The lymph vessels are "very abundant" in serous membranes—in the sub-

epithelial tissue—and from which short vessels pass vertically to open by minute orifices into the serous cavity.

Now, what is the corollary, inference or conclusion deducible from the foregoing statement of facts? Necessarily the premises being admitted, we cannot fail to realize the significance of a disordered lymphatic circulation in every instance where the organs or structures mentioned become involved—from injury, from simple inflammation, or from septic infection, such as pleurisy, pneumonia, pericarditis, peritonitis, appendicitis, cerebritis and meningitis, arthritis and rheumatism.

Inasmuch as this subject has received but scant attention in our text-books, it will be in order to discuss briefly its bearing in the class of cases referred to—for the special purpose of elucidating the nature of the chemic deviation responsible for their appearance. The intractable character of these disorders is well known; the futility of medical treatment is acknowledged; and as a consequence, surgical operations have become the vogue, so that hospitalism threatens to become the war-cry of modern civilization, simply because the medical profession has overlooked a minor detail in physiologic chemistry. Indeed, as a matter of fact, it is no exaggeration to claim that the disorders mentioned would occur but seldom under rational methods of treatment—first and foremost being the absolute necessity for restoring the normal alkalescence of the body fluids and tissues, *to make the cells work*.

The Lymphatic Glands.—Perhaps this subject will be better understood by a brief description of the lymphatic glands, as follows:

“The lymphatic glands are small bodies, varying in size from a pea to an almond, situated in the course of the lymph vessels in several regions of the body. They are found especially in the groin, armpit, mesentery, back of the abdomen, roots of the lungs, and side of the neck. Entering one end of each gland are lymph vessels named *vasa afferentia*, and emerging from the opposite end of the gland are the lymph vessels named *vasa*

efferentia. Each gland is invested by a capsule of connective tissue, which sends processes into the substance of the gland to divide it into compartments; it consists of adenoid tissue, and the meshes of its retiform connective tissue contain multitudes of lymph corpuscles. Each gland is permeated by a network of minute canals, which are continuous with both the vasa afferentia and efferentia; the gland, therefore, is traversed by a stream of lymph which washes the lymph corpuscles out of the meshes of the reticulum, and in this manner these corpuscles find their way into the lymph. The lymph glands are, therefore, centers of origin for the lymph corpuscles. The collections of adenoid tissue, forming the solitary and Peyer's glands of the intestine, and found in the tonsils and other localities, are also without doubt, centers of formation for the lymph corpuscles."

The lymphatics, it will be seen, are directly concerned in the production of lymph corpuscles (lymphocytes), essential elements in maintaining normal conditions of health. When the alkalinity of the blood is diminished, as is always the case in disease, oxidation is lessened, elimination is retarded, chemic changes take place, with the result that there is obstruction in the lymph-glandular apparatus, arresting or hindering tissue change, this in turn, giving rise to congestion, inflammation and breaking down of the tissues.

Appendicitis.—Taking appendicitis as an illustration, we always have a history of indigestion, acute, subacute or chronic—and indigestion invariably points to excessive acidity with disordered innervation. Consecutively, the microorganisms in the intestinal tract are "sucked" up by the lacteals along with the chyle and thus are brought directly into contact with the congested and inflamed peritoneal covering of the appendix—*when septic infection is established*. Such a case is properly transferred to the surgeon, because the physician neglects his opportunity. Of course, there are "fulminant" cases of appendicitis where septic infection is fully established when medical advice is first asked for, although this rarely occurs without premonitory

symptoms. Usually, however, the symptoms of appendicitis lead to drastic, even fateful treatment—the unscientific and reckless use of laxatives and purgatives, for which there is neither excuse nor reason, since the congestion, inflammation and septic infection are in the peritoneum and connective tissue, and not in the intestinal canal. The doctor is playing “ante-over” without a partner and, of course, the game is a fiasco.

A critical study of this malady will prove interesting and suggestive—also instructive. In addition to the lacteals—which carry lymph during the intervals of digestion—we have the lymph vessels proper in the serous membranes (peritoneum), which invests the appendix; they are found also in the apposite connective tissues. Now, congestion and inflammation—nearly always marked in the indigestions—tend to obstruction of the lymph vessels and glands. Arrest of function leads to disintegration of the lymph corpuscles with liberation of the fibrin ferment. This ferment then acts upon the fibrinogen to produce “clotting”—and a clot means obstruction, temporary or permanent, dependent upon the antiseptic and solvent properties of the body fluids, the blood and lymph. Restore the normal alkalescence of the blood and these lymph structures will resume their functions, the congestion and inflammation will subside—although in the case of septic infection, we must adopt medication to act chemically upon the obstruction and upon the associated chemic deviation—to prevent extension or distribution.

Thus, we are dealing with two distinct factors—the acid excess being dominant, or primary, the chemic deviation (magnesium infiltration), being secondary or predisposing. That is to say, magnesium infiltration, an effect, proceeds *pari passu* with the acidity; hence, the necessity for discrimination in the matter of treatment—and the utter folly of laxatives and purgatives, as well as narcotics to produce euthanasia, or deadly antiseptics to do harm by destroying the tissues.

The Rational Plan of Treatment.—A word on the rational plan of treatment will be appropriate in this connection, as follows: (1) Neutralize acid excess by means of alkaline-saline medication; (2) Counteract the tendency to clotting in the lymph channels and glands by the employment of an alterative, calcium sulphide; (3) Avoid Epsom salts (magnesium sulphate), and promote magnesium dissociation, by the employment of its known antidote, calcium salts; (4) The presence of bacterial flora in excess in the intestine should be controlled by remedies which act through the medium of the nervous system, in the form of colloids, or by symbiosis.

The reader should bear in mind that these teachings apply with equal force in the case of pleurisy, pneumonia, pericarditis, peritonitis, meningitis, and arthritis, since they all involve serous membranes and in every instance there is the congestion and inflammation and septic infection, and the same tendency to obstruction of the lymph channels and glands. The analogy might be carried out almost indefinitely, since the principles of treatment remain practically unchanged in dealing with other varieties or types of disease, such as earache, headache, neuralgia, neuritis, tonsillitis, goiter, mastitis, skin diseases, etc. We often see the evidences of faulty and irrational treatment—in scarlet fever, diphtheria and typhoid, in the form of congested, inflamed and suppurating lymphatic glands of the neck—and most unfortunately of all, modern science gives us no hint of a successful method of internal treatment. Indeed, it is doubtful if the laity would take kindly to any plan of treatment which gives promise of almost immediate relief, without local applications—and the profession would “damn it with faint praise,” fearing that the innovation would decimate the ranks of their clientele.

Osmotic Pressure and Osmosis.—These subjects have already been referred to; they are important biologic factors in both animal and plant life. We get a fairly good idea of the significance of osmotic pressure in the case of hernia (rupture), also in the case of puncture-wounds,

when osmotic pressure causes protrusion of the underlying tissue—the brain, the chest and abdomen. For example, the brain is covered or invested with a serous membrane, the pia mater; the liver is likewise invested with a serous membrane, that portion of the peritoneum being known as the capsule of Glisson; the same is true of all the various organs, such as the lungs, heart, spleen, pancreas, kidneys, so that these different organs functionate under pressure, this pressure being regulated or controlled by the phenomenon known as osmosis.

Osmosis, the diffusion of liquids through membranes, animal or vegetable, is modified or governed by five different circumstances—(1) Density of the membrane; (2) Motion of the liquids; (3) Chemic reactions; (4) Temperature; (5) Physical character—colloid or crystalline. Thus, with an acid liquid on one side and an alkaline solution on the other, diffusion takes place more rapidly than when both have the same chemic reaction. Motion and also heat will accelerate diffusion, but density of the membrane is always an essential factor. Again, while colloids, such as starch, gelatin, albumin, etc., diffuse slowly, crystalline solutions quickly pass through membranes, this being notably augmented by heat and motion.

To secure osmotic pressure, therefore, the particles, simple or compound substances, must be dissolved—as is the condition of the body fluids. Hence, the necessity for taking account of the chemic reactions in treating disease—if we expect to maintain osmotic pressure and insure osmosis in the glandular appendages, in the various organs, and generally, in the tissues throughout the body. Osmotic pressure is equivalent to that (force) which would be exerted by an equal amount of the substance, when converted into a gas and occupied the same volume at the same temperature as the solution.

When the body fluids, blood and lymph, are surcharged with acid, osmosis is diminished, or ceases altogether—as in disease—but this clinical fact is overlooked or neglected in conducting treatment, routine methods being confined to the

administration of remedies which enact the rôle of stimulants, a subject more fully discussed under the head of "Inorganic Ferments." That is to say, in the case of debility, stimulants are employed; when heart failure threatens—in pneumonia, influenza, typhoid, diphtheria and scarlet fever—resort must be had to stimulants, and that, too, regardless of the patent fact that the debility and cardiac embarrassment are due to the chemic deviations in the body fluids. Of course, the medicaments employed, entering the blood as solutions, exert osmotic pressure, because of their surface energy, and thereby augment osmosis, but it is an artificial stimulus, and necessarily transient. By simply neutralizing acidity, the demand for artificial stimuli disappears—and it seems incredible that this *hiatus* has so long escaped the attention of the medical profession.

THE CAUSATIVE FACTOR IN HEART FAILURE.

A Practical Theory—Proportions of Lime and Magnesia in the Nuclear Mass—Maintaining the Heart Throb—Mineral Salts in Animal Organisms (Tabulation)—The Demand for Phosphoric Acid—Magnesium a Resistance Coil—Types of Magnesium Infiltration—The Chemistry of Insanity—Neurasthenia.

In physiologic studies we must always carefully note any fact which does not accord with received ideas. It is always from the examination and discussion of this exceptional fact that a discovery will be made, if there is one to make.

CLAUDE BERNARD.

A Practical Theory.—In view of the frequent sudden deaths from some obscure heart trouble, so-called "heart failure," the present inquiry seems timely and pertinent. Indeed, the alarming frequency, coupled with the fact that the malady attacks rich and poor alike in every station of life; and not alone those who are confined to the sick-bed, but also those who are apparently in perfect health, appears as a challenge to the medical profession, demanding at least a reasonably convincing and practical theory as to the underlying cause, or causes—direct and indirect, immediate and remote, inherent or personal and hereditary, dietetic or climatic, anatomic, physiologic or chemic. The terms "nerve-strain," "brain-storm," "emotional excitement," and other spavined excuses are utterly meaningless to the scientist, while the intelligent layman cleaves more trustingly to his preconceived agnosticism. However, the conditions and symptoms are now so easily recognized that the final tragedy may be averted, or indefinitely postponed, and thus, heart failure is no longer an academic question.

Following up the line of research outlined in the preceding pages, the present article will aim to concentrate the attention upon a varied assortment of facts, anatomic, physiologic and chemic, convincing in themselves, and when

coördinated with therapeutic results, the demonstration is complete and conclusive.

For the reader's convenience, it should be stated that magnesium infiltration is a diathesis involving the nerve structures—and cellular activities—as a result of magnesium deposits, with coincident depletion of the lime content.

Both lime and magnesium are proximate principles, essential, elementary substances, without which neither animal nor plant life could exist. Remove these minerals from the dietary of man and animals, and there follows muscular weakness with nervous excitability and finally death from spasm—a fairly complete counterpart of the phenomenon which occurs in heart failure, the spasms taking place in the muscular mechanism and traceable to insulation of the organ, through deposits of magnesium, which hinder, impede or destroy the uninterrupted transmission of nerve impulses.

Another fact of paramount importance relates to the distribution of mineral substances in health, together with elimination during disease. Thus, the proportion of lime and magnesia differs in the various organs, and that too, with a marked and peculiar regularity, while in certain diseases, and notably in starvation and inanition, there is a loss of lime without any increased output of magnesium salts. Diabetes furnishes an illustration, the marked elimination of lime being attended with muscular weakness and nervous excitability. Tuberculosis supplies another example, the elimination of lime being out of proportion to the loss of magnesia. To be understood, however, these deviations must be interpreted: They are actually conservative, the formation of nucleo-proteids being dependent upon the presence of magnesium salts. In the presence of an acid, however, there is lime depletion, replacement by magnesia and death of the cells, since magnesium compounds do not possess the property of imbibition (absorption).

Still another point should be mentioned, namely, that magnesia is found in excess during growth and development, a fact to be borne in mind when we have to deal with any

serious disease in children and adolescents, since the organized nucleo-proteids undergo transformation as above described. Another redeeming feature is to be found in the fact that the nuclear mass in embryos and young animals is larger in proportion than in adults—and the lime content is greater.

Proportions of Lime and Magnesia in the Nuclear Mass.—A study of the proportions of lime and magnesia in relation to the percentage of nuclear mass, both interesting and instructive, has a special bearing upon the present inquiry, owing to the convenience for comparison. For example, the nucleus of a muscle fiber is small, while the relative size of the nuclear mass in glandular organs is large and the lime content greater in proportion. The accompanying tables have been adapted from Dr. Oscar Loew's excellent monograph, *The Physiological Role of Mineral Nutrients*, published some years ago. The analyses of Katz show that the muscles of fishes and batrachia contain two or three times the lime content found in those of mammalia, this work having been preceded by the findings of zoölogists, to the effect that these muscles are relatively richer in nuclear mass than those of mammalia—the muscles of mammalia contain in most cases more magnesia than those of frogs and fishes. In addition, should be mentioned here the fact that in certain organs where the nuclear mass is small, there is a relative increase of magnesia, the human brain containing about ten times as much magnesium phosphate as calcium phosphate. This latter observation should stimulate investigation on the part of psychiatrists and alienists, in view of the fact that magnesium oxide is soluble in weak solution of carbon dioxide. The question naturally comes up, Do anodynes, hypnotics and sedatives act indirectly, by favoring an accumulation of carbon dioxide, and thus produce hydrolysis of the magnesium oxide?

Maintaining the Heart Throb.—This inquiry is also pertinent when we consider the relative proportions in human muscle, three to one, although it shows the natural safety valve afforded to promote recovery. Take the heart muscles

as an illustration. The investigations of His show that a special bundle of muscular fibers connects the upper and lower chambers of the heart, transmitting the heart impulse in such a direct way that a rhythmical throb is accurately maintained. Now, as a result of impaired digestion, or disease, with consecutive acid excess, certain chemic changes take place in these muscular fibers and coincidently in their nerve supply—and as a result of defective innervation there is a lack of muscular coördination with cardiac embarrassment. The modern, strenuous life is a factor, but not necessarily the principal cause of heart failure, the correctness of this deduction being shown by the results of rational treatment.

Mineral Salts in Animal Organisms.—The following tables, showing the proportions of lime and magnesia in animal organisms, have been carefully compiled from reliable data and will serve to emphasize the claims advanced.

ANIMAL ORGANISMS—1,000 PARTS FRESH MUSCLE.

	Part calcium.	Part magnesium.
Dog	.0685	.2370
Hog	.0806	.2823
Deer	.0959	.2906
Cat	.0846	.2863
Man	.0748	.2116
Average	.0809	.2611

FISHES AND BATRACHIA.

Frog	.1566	.2353
Shad	.2206	.1670
Eel	.3913	.1782
Average	.2562	.1935
Fresh liver, 1,000 parts	.2842	.0125

COMPARISON OF AVERAGES.

	Calcium.	Magnesium.	Calcium.	Magnesium.
Mammalia (muscles)	1.0 to	3.23 or	0.31 to	1.0
Man (muscles)	1.0 to	2.95 or	0.33 to	1.0
Frogs and fish (muscles)	1.0 to	0.75 or	1.33 to	1.0
Liver (mammalia)	1.0 to	0.04 or	25.00 to	1.0
Brain (human)	1.0 to	10.00 or	0.10 to	1.0

The foregoing figures are interesting and suggestive only when we bear in mind that growth and development are dependent upon a minimum supply of the mineral salts, all proteins being combined with mineral substances, thus giving them specific properties; that one cannot replace another, and that functional disorders, as well as the various prevalent diseases, are attended with derangement of the physiologic equilibrium, one of the most important of these being the lime depletion of the nuclear proteid consequent upon an acid excess, with consecutive decrease in the normal alkalescence of the blood.¹

Moreover, solutions of mineral salts possess osmotic properties and produce motion—in the body fluids—so that when taken into the stomach, alone, or as part of the food, an osmosis immediately begins, one current *into* the stomach, and another *from* the intestinal tract.

The Demand for Phosphoric Acid.—An explanatory note should be added relative to the demand for phosphoric acid, this substance being responsible for the weak alkaline reaction of the protoplasm; it is also essential to the production of calcium phosphate—for bone formation. Hence, we are confronted with defective bone formation in the absence of lime or calcium, arising from acid excess. Another significant fact relates to the functions of lime and magnesia in growing plants. Thus, when the former is diminished in experimental investigations, growth is affected unfavorably, the employment of organic fertilizers being insufficient to restore them to normal, although the beneficial effects fol-

¹ As a matter of fact, only bacteria and certain low forms of vegetable organisms can sustain life and fructify in solutions containing magnesium salts in abundance. Thus, magnesium infiltration becomes a dangerous complication in every disease due to bacterial invasion. Bacteriologists have not overlooked this peculiar property, and as a result, we find that all culture solutions are liberally charged with magnesium salts. The reason for this lies in the fact that these solutions furnish the most favorable conditions for the assimilation of phosphoric acid and they are available whether acid or alkaline. This is well illustrated in the case of rapidly growing children, where bone formation is defective and attacks of infectious disease are always serious and convalescence prolonged.

lowing the addition of lime are pronounced and permanent. The same is true when studied clinically, all forbidding symptoms disappearing as if by magic on the exhibition of lime salts in the case of magnesium infiltration, even to the complications threatened by the presence of bacteria. While it is not safe to claim that lime is an antidote to magnesium in excess, the evidence in its favor as a catalyzer is apparently conclusive—and in the treatment of “magnesia heart” the results are little short of marvelous.

Magnesia a Resistance Coil.—Enacting the role of a resistance coil, magnesia is a regulator and controller in the transmission of electric energy; it is also an important factor in the distribution and radiation of heat. In the former instance, a surplus deposit interferes with nutrition by hindering the transmission of nerve impulses, easily recognized in the circumscribed, lancinating head-pains which precede paralysis and apoplexy. In the latter case, insulation leads to skin diseases, paresthesia, and in pellagra, gangrene of the extremities, this peculiar feature being well marked in eczema and psoriasis, after the exhibition of calcium salts in small doses—when the subjective sensation of heat radiation is intense.

Types of Magnesium Infiltration.—According to my present conception of the diathesis, three distinct types of magnesium infiltration may be recognized by the clinician, viz.:

1. Simple replacement.
2. Chemic transformation.
3. United with calcium.

(1) Simple replacement may be studied in the later stages of cholera morbus, cholera infantum, typhoid fever, gastrointestinal catarrh and other varieties of bowel troubles, both acute and chronic, characterized by muscular weakness and nervous excitability—the morbid complexus being due to the replacement consecutive to acid excess. The administration of magnesium sulphate (Epsom salt), likewise furnishes an excellent illustration of replacement, the acid radicle combining with the calcium content of the nucleo-proteid, magnesium taking its place and transforming it into a magnesium nucleo-proteid.

(2) Chemic transformation is a more or less constant factor in all deviations from normal, because of the transformation of the magnesium salts into magnesium oxide, through the action of oxidase, a normal product of glandular activity. Magnesium oxide is the only known substance which will combine with organic colloids in alkaline solution, and it is assumed that this position is tenable and warranted—the evidence being supplied by laboratory demonstration. Further, it is amply confirmed by the crucial test of clinical experience, magnesium dissociation being followed by recovery.

Included in this category, several disorders should be mentioned as a means of giving a practical turn to the present article. First in order comes heart failure, an extremely complex problem, in view of the fact that it arises from muscular spasm due to defective innervation (incoordination), consecutive to diminished alkalescence of the blood and deposit in the nerve structures of magnesium oxide—a chemic transformation. A similar condition is seen in the case of neuritis, where the pain is constant. In neuralgia, particularly the persistent cases, there is a suspicion of calcium oxide being present as a complication, when treatment fails to show the usual prompt results, although, bearing in mind that the disorder in all cases is merely a local manifestation of constitutional involvement, we must use our best endeavors to correct the diathesis.

The chemistry of insanity must eventually be worked out on this hypothesis, as the disorder is almost certainly traceable to intestinal indigestion as the initial deviation from normal, with or without liver complication. Indeed, the investigations so far have brought to light one of the most potent arguments against “race suicide.” For example, it is well known that celebrities as a class are more susceptible to insanity than the married. From analogy we reason that the development of magnesium oxide being the same in the animal and vegetable kingdoms under normal conditions, this similarity would also hold good under abnormal conditions, referring here to fruit-bearing and child-bearing.

The fact is that the wood of non-bearing fruit trees contains from sixty to one hundred per cent. more magnesium oxide than those which are fruiting—during the same year.¹ Thus do we winnow the chaff of superstition and tradition until we find the kernel containing the germ of truth.

Neurasthenia should be mentioned in this connection, since one of the most successful expedients in treatment accomplishes in part the hydrolysis of magnesium oxide—the Nauheim bath. Stress is laid upon the temperature of the water, the formation of bubbles which stick to the skin and also the addition of calcium chloride, patients being cautioned about exercise for at least an hour after the bath, because of the embarrassing effect upon the heart. Of course, it is now an open secret that in neurasthenia—and also in heart disease—magnesium oxide involves the trophic nerves, so that when carbonic acid in hot solution penetrates the pores of the skin, osmosis ensues, chemic transformation takes place, shown by the bubbles, and the calcium present in the bath supplants the magnesium deposits, thus gradually restoring the nerve structures to normal.

How long it will be, and just how many baths will be required, before the nerve supply of the heart is ameliorated, are difficult questions to answer without referring to the literature, but the probabilities are that they are similar to the instructions given for carrying out the “Rest Cure”—stay in bed seven or ten weeks, then go back for another series.

(3) Lime and magnesia constitute the main ingredients of cement; when water, sand, and broken stone are added, chemic action takes place, carbon dioxide is given off and

¹ The thirtieth annual report of the Pennsylvania State Hospital for the Insane, at Norristown, recently issued, apparently confirms this deduction. Thus, with a resident population of nearly three thousand, the report shows that the greater number are women—and also that there are more single men and single women in the wards than there are married ones. A significant fact with a direct bearing upon this factor relates to the age when the mental disorder first manifested itself—a majority of the men being overcome between twenty-five and thirty years of age, while the greatest number of women were affected between the ages of twenty and thirty.

concrete formed. The human liver contains nearly two per cent. inorganic matter, together with liquids, and with the normal allowance of lime and magnesia passing through it, were it not for the presence of organic matter, living, organized cells, there would be danger of concrete forming—usually called gall-stone.

It is in evidence that the liver does at times develop the characteristics of a stone quarry, women being much more susceptible than men. Stone is also found in the kidneys, in the intestine, and I have collected several reliable reports where “stone” had involved the heart. It is not unusual to find patients with arteries so brittle that they must be cautioned against undue exertion, and a surgical operation requiring an anesthetic is out of the question—because of the deposits of magnesium united with calcium.

In conclusion, there are three distinct lines of chemico deviation indicated by a study of the problem in nutrition—

- (1) Impaired digestive capacity.
- (2) Acid excess.
- (3) Magnesium infiltration.

THE CAUSATIVE FACTOR IN HEART FAILURE— CONTINUED.

THE MAGNESIA HEART—Diagnosis—Objective Symptoms—The Psychic Factor—Subjective Symptoms—Muscular Twitching—Numbness—Insomnia—Associated Symptoms—Cerebral Symptoms—The Tendency to Obesity—Arterio-sclerosis—Class of Cases—Treatment (Tabulation)—Symptomatic and Collateral Treatment (Tabulation)—To Restore the Digestive Capacity—To Neutralize Acid Excess—To Promote Magnesium Dissociation—Lymph-stasis—Hepatic Insufficiency—Constipation (Epsom Salts)—Typical Illustrations—Aphasia—Statistics.

“The Magnesia Heart” is the name which I have employed provisionally to cover practically all functional derangements dependent upon disordered innervation arising from magnesium infiltration, and involving the cardiac nerve mechanism, together with the disturbances due to organic changes in the circulatory apparatus and musculature from the same cause. Magnesia heart must be differentiated from rheumatism, neuritis, neuralgia, calcification, sclerosis from specific infection, septic infection, ptomain poisoning from the alimentary canal and from myocardial degeneration, which is not difficult when the associated symptoms are so easily distinguished. Add to this the universal alarm which prevails among men over fifty years of age, owing to the frequency of sudden death within their circle of acquaintance, and we have an incentive, a stimulus to discover the mystery—by verifying or disproving the claims here presented.

The chemic deviations in the vascular system are discussed sufficiently in detail in the preceding pages to enable the reader to comprehend the significance of the various types of degeneration—as understood by physicians generally. In the case of “magnesia heart,” however, there are certain signs and symptoms peculiar to the disorder which enable us to make a positive diagnosis—because the corrob-

orative evidence is complete, more fully developed in the subsequent reports of typical cases.

Diagnosis: Objective Symptoms.—The most characteristic objective symptom of *magnesia heart* is lack of motor power. The heart sound is muffled; the first sound is indistinct, while the second sound is accentuated—with valvular incoördination, there is a watch-tick “click.” In most instances, there is a significant “boom,” or metallic sound, following (coincident or consecutive), each cardiac contraction, due to the lack of resiliency in the arteries—arterio-sclerosis. Thus, we find associated chemic changes in the arterial system, the small, quick pulse, increased blood pressure, and abnormal reflexes, showing the intimate relation to the nervous system. Other objective symptoms include acid salivary reaction (usually), highly acid cutaneous reaction, together with intense acidity of the urine—and of course, all this means diminished alkalescence of the body fluids (blood and lymph), and necessarily, evidences of impairment of the digestive capacity, notably intestinal digestion. Percussion over the stomach usually shows more or less distension, perhaps dilatation, but the most significant symptom is to be found by percussion over the ascending colon. The evidence of intestinal indigestion, from acid excess, is strikingly elicited—by gaseous accumulation, with distension, or even well marked dilatation, so that many of these subjects live in constant dread of an operation for appendicitis.

The **psychic factor**, therefore, must not be overlooked. Indeed, it is not unusual to find that an operation has been done under the impression that chronic appendicitis might be responsible for the nervous manifestations. The neurasthenic element is usually pronounced and patients are skeptical in regard to treatment, because the diagnosis is not in harmony with their own conception, nor does it correspond with the deductions of their previous medical attendants.

Subjective Symptoms.—The subjective symptoms are less informative, since their presence may be associated with other changes of a physiologic nature, which tend rather

to obscure the dominant factor. Some of them, however, are of sufficient importance to require consideration. For example, persons suffering from *magnesia heart* experience difficulty in breathing on the slightest exertion; a walk of a few blocks up a slight incline will cause them to stop and rest. Another symptom relates to sudden attacks of faintness or dizziness, even when the person is not exercising; in fact, these attacks may come on when the patient is lying in bed, and, as a rule, they will say they are unable to lie upon the left side because it produces a sense of suffocation. Sighing or yawning are other subjective symptoms due, in my opinion, to defective or impaired innervation of the diaphragm, because in young persons this difficulty may be overcome by moderate stimulation of the vasomotor nerves along with remedies which act upon the lymphatics. So, we see how the chemic deviation extends and involves different functions.

Muscular twitching is not unusual; it may affect the superficial muscles of the arms or legs, or it may manifest itself by causing a sense of tremulousness in the abdomen, this latter symptom being more noticeable in females. A case of muscular twitching following a surgical operation is interesting in this connection. A gentleman upwards of fifty years of age slipped on the ice, causing dislocation of the knee-joint with fracture of the patella. Taken to the hospital, the first operation was directed to the dislocation, the patellar fragments being united a week or ten days later. Immediately there was twitching in the muscles of the injured leg, so much so that the patient was unable to sleep. To overcome this difficulty the surgeons could find nothing better than morphine. Fortunately, the victim was suspicious that he would become an habitue, and after the treatment had been continued for a week or more, he declined it. While this man was in the hospital, of course, it was not practical for me to interfere with the treatment, but I promised to afford relief when he returned home. The record of this case will be found more complete on page 288.

Numbness affecting the fingers and toes is very common, and it is not unusual to have patients complain of this peculiar lack of sensation on awakening in the morning. Indeed, they often suffer from indigestion, and this causes sleeplessness, so that they frequently wake up and find it necessary to "rub" their hands and fingers in order to restore the circulation. A personal acquaintance who rides on the same train with me, a man 54 years of age, and quite stout, seemed to take a great deal of pride in this peculiarity, because the doctors had not been able to relieve him, but when I told him it was likely to shorten his life, he shunned me—nobody wants to hear bad news, especially when they feel warranted in not believing it. In 1884, I reported a case of endarteritis, occurring in a lady over 50 years of age, and fortunately, I had opportunities for advising treatment occasionally, although not as regularly as I should, with the result that she lived to be about 79 and enjoyed remarkably good health, except occasional acute attacks of indigestion. She was not disposed to take kindly to dietetic suggestions, feeling that it was unnecessary, because she had all her life eaten just what she wanted to, what was palatable.

In some cases the peculiar "*boom*" and "*click*" attending the heart contractions become very annoying. Patients complain that they are unable to get to sleep because of the sound being carried to the left ear, but when treatment has caused this to disappear, they seem to think it was a good joke. Pain over the heart is not a common subjective symptom, although this is manifested in persons of sedentary habits after continued exertion or physical exhaustion.

A case is recalled, that of a man weighing over 200 pounds who had this difficulty for a year or more. He had been advised that it was a rheumatic element, but the salicylates afforded no relief. This treatment was alternated with osteo-therapy, but while the latter was of temporary benefit, no permanency was secured. After being subjected to the usual manipulations, he felt entirely free from pain, but it would return with as much

violence after he had walked half a dozen blocks to his office or to his home. The administration of iodo-calcium was attended with immediate and complete relief, the patient discontinuing the medicine after a period of three or four days—on the mistaken supposition that treatment had been conducted for the purpose of acting upon the bowels. As a result of relieving the tension, the secretions were increased to an alarming extent, being from five to ten free bowel movements daily, mostly of a watery character with coffee-ground sediment.

A few months later, the pain returned, however, although less persistent, and the patient seemed to think that osteo-therapy was the only treatment that gave promise of relief, and, of course, I encouraged him, with the result that after a month or six weeks a cure was established. The patient was informed that the heart pain was due to sub-luxation of a rib.

The record of this case is particularly interesting, since it shows the difficulties in diagnosis as well as the limitations of medical treatment and osteo-therapy.

Insomnia is almost invariably a subjective symptom, and these patients, as a rule, furnish clinical pictures—of intestinal indigestion. They regularly wake up between two and three o'clock in the morning and find it difficult to get to sleep again; when they do sleep, however, it is from exhaustion, and they awaken late in the morning very much depressed, with no appetite, and if food is persisted in, the result is headache, nausea, intestinal pain, with looseness of the bowels and constipation alternating.

Associated Symptoms.—The associated symptoms are especially valuable in confirming the diagnosis from the objective symptoms, and unfortunately, these symptoms or manifestations are treated as entities. Thus, the optic nerve may be involved or the nerve supply of the muscles, and it seems necessary to apply glasses. Let the same patient submit to treatment for the relief of this complication (magnesium infiltration), and the glasses may be discontinued. This is true of all the organs of special sense. A person may suffer from defective hearing, owing to

involvement of the nerve supply, with lymph-stasis, but when this difficulty is corrected, the hearing is restored. The same is true of taste and smell, and in respect to the latter, it is noteworthy to observe that as a result of the chemic deviation in the body fluids, both taste and smell may be subjected to peculiar variations from normal, but a study of this question will lead us too far from the subject in hand.

It may be stated generally that the nerve supply of muscles may be involved to such an extent that the condition of the heart is overlooked. Thus, we may have incoordination of the muscles of deglutition. The patient may be unable to swallow food without choking, and it is not unusual to have these subjects complain of a peculiar, painful sensation in the throat, or at the root of the tongue. A medical acquaintance, a gentleman over sixty-five years of age, whom I had known for nearly twenty-five years, told me one day about his throat difficulty. He named the prominent men who had made a "thorough examination;" he said that they were utterly nonplussed, as they could find no growth, congestion or morbid condition whatever, and he added, "I suppose you would say this was due to magnesium infiltration?" In reply, I said, of course, and that the treatment would confirm the diagnosis, but he was even more than suspicious and treated the suggestion with ridicule. As a final shot, I told him that the throat difficulty was simply a local manifestation of constitutional derangement, and that it was only a question of time when my diagnosis would be verified, and, six months later, he died after a short illness.

Similarly, the nerve supply of different organs may become involved along with the chemic deviation in the nerve supply of the heart. We have ample evidence of this in the case of liver disorders, and notably in diabetes mellitus. The kidneys also suffer in like manner, marked evidences of this being found in the case of Bright's disease (nephritis). The abdominal viscera do not escape, shown by the tendency in these cases toward constipation, by the

frequency of symptoms accompanying an infection of the appendix, and in females, the almost universal complaint of menstrual difficulties. At the present writing the writer has under observation a lady, 45 years of age, who has suffered for a considerable period from involvement of the nerve supply of the rectal muscles, a typical case of neuritis, which readily yielded to treatment conducted for the purpose of promoting magnesium dissociation, rectal dilatation being added. This patient also had various typical objective and subjective symptoms—the heart had the watch-tick click, there was acid salivary reaction, marked evidences of intestinal indigestion, and she said she could feel the intermittent action of the heart even while lying in bed. In addition to this, there were muscular twitchings affecting the superficial muscles, small patches of numbness were noted in the extremities, fingers and toes. Apparently, a woman of robust health, these chemic deviations had caused her to become for all practical purposes a semi-invalid, and the neurasthenic element was pronounced.

The cerebral symptoms associated with magnesia heart are frequently such as to attract more attention than the principal condition. Such patients will complain of a tendency to stumble as they walk along the street, showing that the cerebellum is involved, which interferes with muscular coördination. Along with this, we are almost certain to develop symptoms of involvement of the motor areas of the brain; the subject will complain of the toes catching on the steps when ascending stairs, and as the motor areas for the legs and feet are located near Broca's convolution, it is not unusual to find symptoms of aphasia or agraphia, or both. However, these latter symptoms are frequently so slight as to be overlooked by the patient, and unless brought out by careful inquiry, we are liable to lose sight of an important factor in diagnosis.

A critical study of these degenerative changes affecting the brain tissues will enable us to understand the morbid changes which take place in paresis—*softening of the brain*—as follows:

"A chronic progressive meningo-encephalitis, characterized by a productive arteritis involving especially the adventitia, with degenerative atrophy and sclerosis of the cortex and sub-cortical portions of the brain. Degenerative changes in spinal cord are associated."

The tendency to obesity should be referred to in this connection, in view of the fact that corpulency increases the work of the heart; hence, the frequency of sudden death in such cases from heart failure when the victim is apparently enjoying robust health. We must bear in mind how adipose tissue is developed, how the actual presence of fat compressing the muscular tissue gradually lessens its bulk, and consecutively, its strength, and also that these changes result in less exercise with diminished oxidation, and the vicious circle is complete.

From the foregoing comments, the reader will easily perceive that the magnesia heart is not in the shape of a sign-post, so prominent that any one can readily distinguish it, and yet it is constantly present. Consequently, the dominating, central defect receives but little attention, the general practitioner treating the associated symptoms actively, while cautioning the patient that he has a weak heart. Thus, it comes about when a fatal termination occurs suddenly and a post-mortem is demanded, we may find numerous evidences of disordered nutrition, all of which are traceable either directly or indirectly to the chemic deviation under discussion. This is well illustrated in the case of a local celebrity who died recently in a Philadelphia hospital. It seems that this man had frequently boasted that no one disease could kill him. An epileptic spasm brought him to the hospital, and after death, the physicians gave no less than six causes, as follows: Chronic pachymeningitis, congestion of the kidneys and spleen, fatty degeneration of the liver, dilatation of heart, abscess on the lungs and edema of the lungs. The man was 40 years of age, enjoyed the best of health, but had no home. He was brought up in an orphan asylum, and spent most of his

time on the streets, living here and there, enjoying life in his own peculiar way.

Arterio-sclerosis.—In arterio-sclerosis, or hardening of the blood vessels, we have to deal with pathologic conditions which lead to closure of the lumen, thus interfering with the blood supply of a large or small area, producing at times atheroma, or an infarct—and the frequency of attendant neurasthenic symptoms makes clear its intimate connection with, or dependence upon, involvement of the nervous system. Evidently, the cellular structures composing the intima of the vessels are first affected, in consequence of a defective blood supply from the vasa vasorum, whose innervation becomes impaired through diminished alkalescence of the blood; hence, it is a local symptom of constitutional derangement, the immediate and remote effects being magnesium infiltration and calcification. Under such conditions the futility of treatment based upon Loeb's theory of nerve stimuli to promote alkalescence must be apparent to the most superficial observer—although the order of the day includes rest, exercise, tonics, arterial sedatives, alteratives, electricity, baths, psycho-therapy, hypnosis, mechano-therapy, artificial hyperemia, etc., all going to show the lack of fundamental principles as a basis of treatment. Bleeding would be far superior to any of the methods mentioned, because it would lessen tension, create a leucocytosis and thus afford temporary relief, but patients are not bled nowadays until after rupture of the brittle arteries.

Insurance officers have become suspicious of applicants who show high arterial tension as dangerous risks, and in the near future the general practitioner will be called upon to treat them, so that a discussion on this topic must prove welcome.

When it has been determined that magnesium infiltration is the causative factor in the production of arterio-sclerosis with its accompanying high arterial tension and neurasthenic symptoms, direct efforts should be made to improve metabolism—restoring as far as possible the physiologic

equilibrium by neutralizing acid excess, coupled with chemic dissociation of the magnesium salts. Unless the normal alkalinity of the blood be maintained, suboxidation recurs, with defective elimination, and besides, diet is not a question of minor significance; indeed, it is of paramount importance after patients have reached fifty years of age.

Class of Cases.—In view of the frequent, we might say common, occurrence of heart failure, as reported in the daily newspapers, any attempt to classify would be futile—indeed, it would be a work of supererogation, since the malady is practically universal. In disease, it affects both young and old in all stations of life, while in apparent health, only children and adolescents escape its insidious invasion. Even here, as a result of dietetic errors, occupation and environment, it is not unusual to find many of the symptoms previously enumerated, objective, subjective and associated, so that it requires no “prevision of genius” to work out the problem of their future.

Treatment.—Before presenting the clinical reports, together with a partial record of rare cases, it will be profitable to study in outline, the plan of treatment. As previously announced, there are three distinct indications, that is, three morbid conditions to correct for the purpose of reëstablishing the physical equilibrium, physiologic and chemic. Now, since normal metabolism or tissue change proceeds only under favorable conditions relating to assimilation, primary and secondary, it follows that we should first endeavor to restore the digestive capacity to a status approaching normal, a physiologic and chemic problem. In the second place, as has been shown, acid excess, a chemic deviation, being the direct and immediate effect of disordered nutrition, treatment should be conducted for the purpose of correcting or neutralizing this defect—and in many instances this alone is all-sufficient, since it contributes to regain normal digestion, while preventing or anticipating subsequent degenerative changes. This brings us to the third indication, the demand for chemic stimuli, to remove the inorganic deposits in the tissues, including nerve tissue,

which impede, hinder or destroy the uninterrupted transmission of nerve impulses, thereby interfering with the functional activity of the cellular structures. This is the chemic problem in nutrition, and here lies the gist of our contention, since it can be easily demonstrated from a clinical standpoint and proven beyond question scientifically, by experimental investigation. Moreover, the scientific evidence upon which the deductions are based is an open book, so that "he who runs may read," provided, of course, that he possesses the mental capacity for entertaining more than a single syllogism at one and the same time.

The following tabulation or diagram is well calculated to illustrate graphically the preceding remarks covering the principles of treatment, and together with the comments will, it is believed, be sufficiently clear and comprehensible to enable the reader to form an intelligent conception of the scheme as a whole and in detail.

TREATMENT OF MAGNESIA HEART (SCHEMA).

I. Restore the Digestive Capacity.

Gall-Ipecac Comp—Tonic Stimulant; Activator;
Copper Arsenite—Intestinal Antiseptic;
Bacillus Bulgaricus—Symbiosis.

II. Neutralize Acid Excess.

Solution Potassium Citrate—Refrigerant, diaphoretic;
Spirit of Mindererus—Febrifuge, diaphoretic;
Alkaline-saline—Cell depurant, eliminant.

III. Promote Magnesium Dissociation.

<i>Simple Replacement:</i>	{ Calcium sulphate (gypsum); Calcium carbonate (vitalized chalk); Calcium phosphate.
<i>Chemic Transformation:</i>	{ Iodo-calcium; Calcium iodide; Calcium carbonate.
<i>United with Calcium:</i>	{ Iodo-calcium; Calcium iodide; Acid sulph. aromatic.

In addition to the above outline, and in advance of a detailed analysis, the accompanying diagram relative to symptomatic and collateral treatment will serve to make the therapeutic picture more complete, suggesting as it does the probable complications or consecutive deviations from normal, along with the most available and practical lines of treatment for their relief—or mitigation.

IV. SYMPTOMATIC AND COLLATERAL TREATMENT.

<i>Vasomotor Disturbances:</i>	{ Gold and sodium chloride; Static electricity; Thyroids.
<i>Lymph-stasis:</i>	{ Nauheim baths; Calcium sulphide; Osteo-therapy.
<i>Hepatic Insufficiency:</i>	{ Soda succinate; Gall-ipecac Comp.; Podophyllin and mercury biniodide.
<i>Constipation:</i>	{ Calcium carbonate; Apia (tablets); Epsom salts (?).
<i>Dietary:</i>	{ Should be regulated ("balanced"), as to proteids, fats, and carbo- hydrates, and furnish two parts lime to one part magnesia, the number of calories being deter- mined by the work performed.

(1) **To Restore the Digestive Capacity.**—Taking up these topics in regular order, it should be stated that the gall-ipecac comp.¹ enacts the rôle of a tonic stimulant. With a dry diet, that means, a diet free from liquids, tea, coffee, milk, water, wine, beer, whiskey, etc., it stimulates the flow of gastric juice; in other words, being an alkali, it complements the action of the salivary secretion, favoring osmosis

¹ The "oxgall combination," referred to in this work, Gall-Ipecac Comp. (Hepatin), has the following formula:

Oxgall	gr. 1;
Powdered ipecac	gr. $\frac{1}{4}$;
Strychnine arsenite	gr. $\frac{1}{100}$;
Nuclein, solution	gtt. iv.

Dose, one or two tablets before meals.

(endosmosis). Salivary secretion being alkaline, the food swallowed is also of the same reaction, and with the addition of the medication, the flow of acid gastric juice is augmented, and thus the medicament becomes for all practical purposes an "activator."

In many of these instances, there is a demand for intestinal antiseptics, due to the imperfect digestion of nitrogenous foods with delayed intestinal digestion, which permits or favors fermentation, when copper arsenite is almost a specific. Besides, it is not rare to find such an abundant intestinal flora that we must adopt symbiosis, that is, we employ the bacillus *Bulgaricus* internally to diminish or arrest the multiplication of bacteria in the intestinal tract.

So far as I have been able to learn from referring to modern text-books and scanning current literature, no attention has been given to the demands for the purpose of neutralizing excessive acidity. Twenty-five years ago, we were taught that it was impossible to treat even mild cases of fever without the employment of the "*neutral mixture*"—solution potassium citrate—either alone or as a vehicle in making up the prescription for a refrigerant diaphoretic. At the same time, in the case of pneumonia, typhoid fever, erysipelas, scarlet fever and other serious diseases, it was almost invariably the custom to employ *spirit of mindererus* (solution ammonium acetate), also for its diaphoretic value and as a febrifuge. However, with the introduction of tablet triturates and alkaloids, these teachings have been overlooked or forgotten, so that we rarely find these preparations mentioned in clinical reports, and what is more, where papers arouse discussion in societies, physicians regarded as prominent, are even willing to admit that they have never employed them at all. So it happens that in the evolution of modern practice, these old remedies have been discarded, and unfortunately, the scientific basis for their early use has been entirely obliterated from our literature.

Early experience in medical practice convinced me of their sterling value, but it was many years before I could thoroughly master the scientific basis for their employment.

Finally, however, the alkaline basis of treatment combined with the remarkably beneficial results prompted a critical study of the whole question, and as a consequence, the alkaline-saline¹ was developed as a cell-depurant and eliminant.

(2) **To neutralize acid excess** involves a chemic as well as a physiologic action—the saline to flush the inter-cellular spaces, and an alkali to restore as rapidly as possible the alkalescence of the body fluids and tissues, thus favoring oxidation and the elimination of the waste material through the normal channels. Lithia, one of the ingredients, is an alkali which increases the stability of protoplasm. When given in concentrated solution, this alkaline-saline enacts the rôle of a liver stimulant, an indirect cholagogue, supplementing physiologic medication. Administered in diluted form, say a teaspoonful in about six to eight ounces of water at room temperature at intervals of two hours, its effect upon the kidneys is pronounced, the urinary flow being more than doubled during the next twenty-four hours.

Besides the objective and subjective effects of alkaline-saline medication, we may note numerous vital phenomena, showing how it augments intra-cellular activity. For example, we can readily understand how it will prove beneficial in the case of muscular fatigue due to the accumulation of waste products in the muscles, sarcolactic acid, carbon dioxide, etc., first felt in the central nervous system, next in the motor end-plates, then in the muscles themselves, and finally in the nerve trunk. The relevancy of this

¹ The alkaline-saline is a *therapeutically balanced salt* in the form of a white, granular, effervescent powder, deliquescent when exposed to the air, and is completely soluble in moderately cool water, with brisk effervescence. It is composed of sodium phosphate and sulphate, equal parts, each heaping teaspoonful carrying about four grains of lithia. Given concentrated, it acts as a liver stimulant and laxative; when well diluted, it increases the urinary water as well as the urinary solids, and being distributed throughout the body tissues, it flushes the inter-cellular spaces and *makes the cells work*.

The lithia salt may be selected with special reference to the disorder, the salicylate for rheumatic conditions, the carbonate for uric acid diathesis, the bromide for the psycho-neuroses and the citrate for renal insufficiency.

observation will be apparent when we consider the claims of Dubois that all nervous disorders are of mental origin—evidently, he has slipped his trolley. In subacute and chronic rheumatism, uric acid diathesis, chlorosis and diabetes, and generally in the case of suboxidation, the utility of this combination must be admitted on theoretic grounds in both acute and chronic disorders.

(3) **To Promote Magnesium Dissociation.**—It should be borne in mind that this chemic deviation occurs under three different forms, although they are not always distinct, as one may lap over on the other. Thus, in the case of children suffering from debility and depression incident to an attack of summer complaint (dysentery and diarrhea), the original malady is due to replacement of calcium salts. This, of course, gives rise to more or less inflammation and obstruction to the circulation. Later, this irritation may lead to chemic transformation, magnesium oxide combining chemically with the colloid of the nerve structure, when we have to deal with an entirely new condition. In the case of advanced age, when the lime is depleted from the bones, it finds lodgment in the soft tissues, arteries, muscles, kidneys, liver, and also in the ductless glands, so that under these circumstances we have still another type of magnesium infiltration—united with calcium.

For all practical purposes, we may omit any discussion of replacement in connection with our study of the magnesia heart. The principal difficulty is undoubtedly due to the diminished alkalescence of the body fluids and tissues, which promotes or favors the formation of magnesium oxide, and this in turn, combines chemically with the colloids of the nerve structure, which impede, hinder, or destroy their capacity for the uninterrupted transmission of impulses.

In the early history of my investigations, iodo-calcium was employed in small doses under the impression that this mechanical mixture of iodine and lime would perform the two-fold function—that the iodine content would act as an alterative, or resolvent upon the inert organic material making up the chemic combination, while the calcium

content was intended to supply the demand for calcium to take the place of magnesium in the tissues consecutive to the chemic change produced. Later, I have employed calcium iodide (the chemic product), in the form of a trituration or tablet triturate for a like purpose, although except in advanced age, it is rarely given alone, owing to the nervous excitability which is likely to follow. The general plan, therefore, is to administer calcium iodide along with calcium carbonate or calcium sulphate in the form of triturations, either as a powder or tablet triturate.

The advantage of this plan is due to convenience in handling the different preparations, adjusting the dose and frequency of administration to the patients' physical condition, while at the same time, we must consider the chemic demands of the system. For instance, under ordinary conditions, it would be sufficient to give the remedies conjointly, three times a day, say five or ten minutes before meals. The triturations being readily soluble, they are immediately absorbed, and do not undergo change from the presence of starch or other substances which would render them inert. Instead of giving a large dose, however, it seems preferable to give the remedies more frequently in urgent cases, and when deemed necessary or advisable, the medicine can be given before breakfast, twice during the forenoon, twice during the afternoon, and then again once or twice before bed-hour. In this way, we not only avoid iodism, but the presence of both together seems not only to prevent intestinal irritation, but also we avoid any nervous irritability. The usual dose employed is a half grain of calcium iodide together with one grain of calcium carbonate or calcium sulphate, and for convenience, I employ tablet triturates containing $\frac{1}{4}$ and $\frac{1}{2}$ grain respectively. Of course, in this class of cases, where the irritation has long continued, there is a possibility that new tissue has formed, fibrous tissue, entirely different from the original, in which case, it is impossible to employ remedies which will cause its absorption, thus restoring normal conditions, and recourse must be had to surgery for its removal.

In the case of deposits composed partly or largely of lime, which we find in advanced age, or as a result of persistent neuritis, neuralgia, or from an injury, it may be necessary to employ a remedy for the purpose of dissolving the calcium content, and this we find in aromatic sulphuric acid, which converts the lime salts into the inert calcium sulphate. Therefore, in such instances, we must maintain as far as possible the normal alkalescence of the body fluids in *alternation* with the acid treatment, since it would be impossible to employ the two together. For example, we can give from ten to fifteen drops of aromatic sulphuric acid in a wine-glass of water an hour *after* meals, continuing the treatment for a week or ten days, after which should be substituted the iodo-calcium or calcium iodide, although I think the latter is preferable because it carries less calcium. The iodine acts as an alterative, a solvent of the organic material which forms the obstruction to the uninterrupted transmission of nerve impulses, and to accomplish satisfactory results this treatment should be continued upon an alkaline-saline basis, preferably alkaline-saline medication.

(4) As shown in the preceding diagram, *symptomatic and collateral treatment* must be conducted for different purposes. When it has been determined by studying the character of the pulse and testing the blood pressure that we have to deal with *vasomotor disturbances*, we have evidence that the vasomotor nerves which control the caliber of the blood vessels are at fault, and the difficulty may manifest itself in different ways. Should the symptoms point to increased arterial tension with vertigo, or deviations in the blood pressure of the extremities, it will be advisable to combine the calcium iodide with chloride of gold and sodium. Perhaps static electricity in the form of the static breeze will prove effective in relieving the cerebral symptoms. When, however, there is evidence of involvement of the ductless glands, it may be necessary to employ thyroid treatment or adrenal extract, although the latter is rarely demanded except temporarily, for the reason that in nearly all such cases we have to deal with increased arterial tension.

Lymph-stasis is a morbid condition which has hitherto received but slight attention at the hands of the profession, but it is none the less important. Indeed, it is of paramount importance to correct this deviation in the circulation, as otherwise we have defective leucocytosis. In such instances, we may combine the internal administration of calcium sulphide with suitable local treatment, preferably Nauheim baths or osteo-therapy, but neither of these latter measures will fulfil our anticipations without attention to the physiologic equilibrium; in other words, to be successful, local treatment must be complemented by means of the normal alkalescence of the body fluids, and that we can secure by alkaline-saline medication.

Hepatic insufficiency is a well worn and antiquated term, which means but little unless properly understood. According to my conception, it applies to a condition of the liver which is just short of normal. To illustrate, we will assume that the liver action is torpid, that there is more or less pelvic congestion, owing to obstruction in the portal circulation, that the flow of blood from the stomach is hindered by this torpid condition, and thus we have to contend with more or less distension or even dilatation, which, of course, means delayed stomach digestion. In addition to this, we shall have symptoms of vertigo, which may be due to the condition of the stomach, or to the presence of bile in the circulation. All these various symptoms, however, do not cover what should be understood by hepatic insufficiency—which means that the liver cells secrete bile and other waste products of the blood as it passes through this organ, but that the bile is not properly discharged. It accumulates in the bile ducts as well as in the gall-bladder, and thus we have a faint conception of the insufficiency which produces, or is accountable for, this torpid condition of the organ.

The succinate of soda and the gall-ipecac comp. will be found advantageous in these conditions, but in cases of long standing the effect is but temporary, and the patient relapses into his former condition—the skin is sallow, the tongue is coated, there is no appetite for breakfast and when

the sufferer is engaged in sedentary work, the complaint of mental hebetude is almost universal. Under these circumstances, we may produce marked improvement by the administration of podophyllin and mercury biniodide, small doses given together every hour or two hours for five doses.

The effect of this treatment is well illustrated by the experience of a former patient who was operated upon for inguinal hernia. The operation was done Friday noon, and early on Sunday afternoon he began to complain of abdominal distension with great pain. The surgical treatment was carried out by the hospital attendants and consisted in the employment of enemata, with Epsom salts and calomel internally, and this treatment was continued diligently until late on Monday afternoon without apparent benefit or any prospect of relief, although the bowels had been moved twenty times. At this time, the patient being exhausted, rebelled against further treatment.

Being at the head of an important manufacturing corporation, he had taken the precaution of securing a private room, together with a telephone, and on Tuesday morning he began to hunt me on the telephone, but not until eleven o'clock did he succeed in finding me, nearly two hundred miles distant. He briefly reported the circumstances, and begged me to advise treatment, as he was convinced that he could not again submit to the original plans which had been carried out Sunday afternoon and the following Monday. Fortunately, he had a pocket-case under his pillow, and I advised him to take podophyllin ($\frac{1}{10}$ grain), and mercury biniodide ($\frac{1}{50}$ grain), together every two hours for five doses and he immediately began treatment. As a result, the distension and pain began to subside perceptibly after the first dose, and along about five o'clock he felt quite comfortable. At his suggestion the nurse employed an enema, but it was scarcely necessary, the bowels being promptly moved, quite freely in fact, and to all appearance, normal in character, and this ended all his troubles from abdominal distension.

Bassini's operation had been done, involving an incision at least six inches in length, but with the employment of calcium sulphide to maintain as far as possible a healthy condition of the lymphatics, improvement was rapid and he was able to leave the hospital on the tenth day following the operation, requiring no further surgical assistance, or medical treatment.

The subject of constipation will receive but brief consideration, not because of its lack of importance, rather for the reason that tradition has led to a misconception of its value as well as a factor in treatment which is utterly misunderstood. Without any special attempt at elucidation, the reader can easily understand how constipation may arise from vasomotor disturbances which affect the blood vessels of the abdominal cavity, because it might interfere with innervation and thus arrest or hinder the normal secretions. Necessarily, also, lymph-stasis, or the stagnant condition of the lymph vessels and glands, produces similar effects, interfering at the same time with the leucocytic function. Hepatic insufficiency is also an important factor in producing constipation. For example, we know that the absence of bile in the intestinal tract deranges digestion, the fats are not emulsified and decomposition follows, leading perhaps to impaction of the bowel, or even obstruction, when a surgical operation is demanded.

In the case of *magnesia heart*, as has been pointed out, the disorder is not confined to the heart alone. Hence, we find that constipation may be due to defective innervation. This is notably the case in anemia and chlorosis, and in such cases we may frequently overcome this by the administration of calcium carbonate or sulphate. In some instances, there is not only impairment of innervation, but there is more or less paralysis of the muscular coat of the intestine, together with well marked evidences of pelvic congestion, shown by the persistence or recurrence of hemorrhoids (piles).

This condition is well illustrated in the case of a patient, a single lady, 55 years of age, who had previously consulted me for the treatment of boils. It seems that for several years she had suffered excruciating pain and annoyance from piles, together with attacks of prolapsus of the bowel, but having a great horror of "cutting," she had said nothing to anyone. She said, "I have never been very strong, but have been able to do pretty good work, and am very necessary to my father and to my home. I hope you may be able to give me something to relieve the trouble."

The above report, while brief, is a fairly complete exposition of the malady. An analysis of the conditions responsible must prove interesting. In the first place, as previously intimated, we have to deal with pelvic congestion. In addition to this, the condition of the liver undoubtedly interferes with the portal circulation, but above and beyond these two deviations, we must assume the initial or primary cause in the disordered digestion which has developed the morbid complexus, and that I conceive to be acid excess.

The prescription, then, should aim to overcome the relaxed condition of the muscular tone of the lower bowel and correct the passive congestion; it should also aim to stimulate the liver function, that is, to relieve hepatic insufficiency (stimulate the flow of bile); and finally, we must neutralize acid excess, so that directions are as follows:

Take one Apia¹ tablet and one Hepatin tablet before meals, the effervescent powder (alkaline-saline), one teaspoonful in about a half goblet of moderately cool water, middle of the forenoon, middle of the afternoon, and again at bed-hour.

¹ Aloes	gr. $\frac{1}{50}$;
Podophyllin	gr. $\frac{1}{20}$;
Ipecac	gr. $\frac{1}{10}$;
Atropine sulphate	gr. $\frac{1}{2500}$.

Three weeks later the patient sent the following report:

"I am very much better. My bowels are so much more comfortable, and I sleep so much better—it is just fine not to lie awake, and feel the nervous twitching, with gas in the bowels."

In regard to **Epsom salts for constipation**, it seems scarcely worth while to make an effort to counteract or arrest this tendency or disposition on the part of either the medical profession or the laity, although it can be said without fear of successful contradiction that this treatment is absolutely wrong, notwithstanding tradition, and also universal use. Not only in the case of *magnesia heart*, but in every possible disorder when the constipation is the collateral factor or complication, the administration of Epsom salts (magnesium sulphate), invariably augments the formidable character of the nervous element, and it is not too much to say that in many cases of illness, both acute and chronic, the continued employment of Epsom salts leads to the necessity for anodynes, opium and its derivatives, so that we must hold the profession responsible for the vast number of habitues who have become victims indirectly from the employment of this preparation.

Instead of discussing the dietary suitable for patients suffering from *magnesia heart*, it will be sufficient to refer the reader to the section entitled, "The Food Problem," in which we have the evidence complete regarding the disadvantages of a dietary containing *magnesia* in excess.

Typical Illustrations.—The following clinical reports were made up in the latter part of 1908 and published in 1909,¹ and are so complete as typical illustrations that it does not seem necessary to add any more recent cases—since they would but duplicate treatment, except as to symptomatic and collateral medication.

Mrs. E., a lady aged 65 years, is very well preserved, but for two or three years past has noticed a lack of interest in every-day affairs and is unable to carry on a conversation

¹ Wisconsin Medical Recorder.

consecutively. It annoys her very much, while talking to a friend, to break in with something entirely foreign to the subject under consideration, and she fully realizes this mental deficiency. The numbness of the fingers is such that she cannot fasten her clothing, and being unable to raise her arms, she must have a maid to dress her hair. She sleeps very well, and has a good appetite, but is somewhat uncertain in her gait and has to be assisted when going up and down stairs. In the course of two weeks, all these unfavorable symptoms had disappeared under the administration of small doses of iodo-calcium.

Mrs. G. is 67 years of age, and for the past eight or ten years has suffered considerably from cardiac embarrassment. She is unable to walk up one flight of stairs without resting, and the doctors have told her she must not go out at night, because of the objections to the night air. The appetite is good, too good, she says, bowels are regular, she sleeps well and is very much chagrined that she should be compelled to remain in-doors so much of the time.

In this instance, an examination of the pulse shows more or less distinct evidences of arterio-sclerosis, but the most conspicuous feature is the characteristic magnesia heart involving the valves—there is perceptible lack of valvular coördination and the second sound is accentuated.

Preliminary treatment consisted in the employment of iodo-calcium in small doses, given between meals, the oxgall combination being taken before meals to correct the hepatic insufficiency, indicated by the appearance of the tongue, which was slightly coated and round instead of flat. In the course of a few weeks, all the formidable symptoms had subsided.

Aphasia is also intimately associated with magnesium infiltration—at least it responds promptly to the dissociation treatment which I have outlined.

Mr. G., aged 41, consulted me about a year and a half ago, stating that he had been under treatment for five years preceding, because of his inability to remember names of persons

and things—sensory aphasia. In addition, during the preceding two years, he had suffered more or less from inability to use his left leg. If he wished to put that over the right he would be compelled to assist with his hands, and when walking on the street it would “drag” and seriously impede his movements.

Examination of the urine disclosed the following: Specific gravity 1.013, reaction, alkaline, albumin, a trace, and also uric acid. It should be stated here that this man has been employed for many years at in-door work, where he sits at a table, and is compelled to use his arms and hands only, but I doubt if this had anything to do with the magnesium infiltration, which affected Broca’s convolution—on the left side, as the patient is right-handed—because the motor centre for the left leg and foot is on the right side, and higher up than Broca’s convolution. Therefore, this involvement was more or less general as regards the circulatory system, the aphasia and hemi-paraplegia being local manifestations of the degenerative changes which had developed incident to the progressive character of the disorder.

Treatment consisted in the administration of the oxgall combination before meals and small doses of iodo-calcium midway between meals, and ten days later, when the patient next presented himself, he reported that the aphasia had disappeared within four or five days, and that for the preceding two days the left leg had been quite as supple, strong, and freely movable as the right.

It would be interesting here to consider the progressive character of the disorder, showing how it differs from calcification and may be found in comparatively youthful patients. I recall one patient (male), 32 years of age, who was frequently compelled to stand still for three to five minutes because of inability to use the left leg, and there were no neurasthenic conditions present, the only trouble being intestinal indigestion, due to unsuitable diet and excessive water drinking.

The following case will assist materially in developing the most prominent symptoms:

G. C., a light-weight, under-sized man, 25 years of age, for the past five years has been dieting for the purpose of developing muscular strength—roast-beef, beef-steak and plenty of tea—and at the time of the first consultation he reported that he was unable to eat scarcely anything, that he had limited himself practically to tea and toast. He was very “nervous,” suffered from persistent insomnia and there was a history of obstinate constipation. An examination of the heart discovered rapid action, pulse being 96 per minute, second sound accentuated, but the most noticeable feature was the metallic sound, or “boom” which accompanied the systole.

Regulated diet, together with small doses of iodo-calcium taken between meals, caused all these symptoms to disappear within a week. The cardiac boom subsided, exaggerated knee-jerk became normal, patient regained a good appetite, said the food tasted right; he slept well and bowel movements were again regular.

Mr. M. was 66 years of age three years ago when he consulted me for nervousness and palpitation. He had been through the civil war, but was in a fairly good state of preservation, except that he was over-weight. His business is not arduous, there is no strenuous exertion required, and he is out-doors a great deal of the time, but he finds it almost impossible to climb a hill or walk up a moderate incline on a smooth pavement, and if he attempts to lift a weight above the waist-line, he falls to the ground, owing to cardiac embarrassment.

For the past ten or twelve years this patient has frequently been laid up in bed for weeks at a time, and all kinds of treatment resorted to for the purpose of keeping him alive. Physical examination shows a rapid, small pulse, almost receding in character, with a characteristic systolic “boom” along with valvular incoördination. The patient says this metallic sound often keeps him awake at night for hours, and as further showing the cardiac embarrassment, the fingers and toes are usually cold, sometimes numb; occasionally, they feel hot and dry, at which time the patient experiences febrile sensations. Reorganization of the dietary with iodo-calcium in small doses internally, and along with this the alkaline-saline medication, caused all

the forbidding symptoms to subside, and he could walk with comparative comfort and freedom an incline not to exceed twenty-five degrees.

A merchant, 45 years of age, has complained of nervousness for several years past, and notwithstanding the solicitations of at least half a dozen well known consultants, he has secured no permanent benefit from medical treatment. He says medical treatment during the past seven years has cost him \$50,000, the doctors having compelled him to relinquish certain commercial engagements which would have profited him that much in this length of time. He has the usual symptoms of magnesia heart, but in addition, there is a peculiarity which annoys him beyond measure—if he shakes his head the least bit, it feels as though there is something loose, and of course, he feels very much frightened, because he realizes the dangers from such an abnormal condition.

Substantially the same treatment was advised here as in the last case, and the patient was very much surprised after the second day the treatment was begun to find that the nervousness had subsided, and that the “lump” in his brain had become firmly anchored.

Ossification.—During the past two years I have collected quite a number of sudden deaths due to ossification, the unusual presence of bone-formation in the heart itself. These I have classed as extraordinary cases of magnesium infiltration, showing beyond question the ultimate tendency of this particular diathesis, but only a few will be placed on record here.

The report comes from a Berlin hospital where a domestic servant, a woman, was admitted with symptoms that defied diagnosis. Later, she was found dead in bed, when a post-mortem examination disclosed the mystery. A malignant tumor—a sarcoma—had spread itself over the entire vault of the cranium, and the heart, liver and lungs were partially petrified by a thick, calcareous deposit. . . . The heart had been literally choked until it could no longer perform its functions.

Another case of "marble-heart" is reported from the City Hospital, Cincinnati. An autopsy revealed that the man's heart was reduced to one-half its normal size, and as hard as a block of granite. . . . The pressure of the stony mass had reduced the right lung to almost nothing and worn the spinal cord to such an extent that it was ready to snap. A deposit of lime salts, following an abscess, is believed to have been responsible for the petrification.

Another case was reported from Indianapolis, a saloon-porter who died in jail. He was the victim of a "rare affliction," in that a bone had formed over the top of his heart.

From the Charity Hospital, New Orleans, comes the report of an interesting case of gradual petrification, really a case of scleroderma, the body slowly hardening for a year, until the flesh became as adamant and proof against incisions. The patient was a woman, 46 years of age, and physicians were unable to diagnosticate the malady during life.

A case similar to the above occurred in the Cozer Hospital, located near Philadelphia. In this instance, an accident preceded the development of the diathesis, the man, 48 years of age, having been thrown from a trolley car. He first began to lose the power of locomotion, and later ossification gradually set in, the trouble extending over the whole body by degrees, except the flesh of the head, which was normal. He could eat without much difficulty, and also smoke, but death came suddenly while taking nourishment, and he died within a few minutes.

A report from San Francisco described an "osseous growth in the pericardial region unknown to surgery." The man was accidentally killed and the bony growth was found in the pericardium.

The latter case was so interesting that I deemed it worth while to make a personal investigation, directing an inquiry to Dr. J. H. Kuser, of San Rafael, Cal., health officer of Marin county, and here follows his report:

"On examining the heart I found a very interesting condition. The pericardium was closely and completely adherent

to the heart itself, the pericardial sac being consequently completely obliterated. I could, however, with the handle of the scalpel, separate the pericardium from the heart, and upon doing so, I found several patches of what I thought to be calcareous deposits about the size of a dollar, and rather sharply defined.

"From a subsequent history of the case as far as obtainable—the man had no relatives—I found him to be English by birth, about 55 years of age, and of good habits. I could not obtain any history in regard to previous diseases. He seemed to have enjoyed good health up to the time of his death.

"It may be further stated that the aorta also contained similar deposits. The man probably had been a sufferer from gout or rheumatism at some period during his life. . . . There must have been a pericarditis at one time, followed by absorption of the exudate with subsequent formation of adhesions."

Statistics.—According to reports from various authoritative sources, the fatalities from heart disease are increasing at an alarming rate. With pneumonia first, tuberculosis second, heart disease is third on the mortuary list—while the reasons and excuses offered and suggested for this sad state of affairs are of the most flimsy and superficial character. Thus, Dr. Darlington, while Commissioner (New York Health Department), in commenting upon the rapid increase of such cases—123 in a week as compared with 58 for the corresponding week of the previous year—advances the following argument, for which there is no substantial basis:

"Heart disease has been on the increase for the past ten years. The hurry and rush and stress of business, the noise and excitement and clamor of metropolitan life, the late suppers, the elaborate food, the stimulating drinks, the constant, restless quest of excitement, money and pleasure, all create a strain on the heart which breaks down the tissues and creates various forms of heart disease."

If we may assign as causes for heart disease "the hurry and rush and stress of business," and "noise and excitement and clamor," why do not the children first succumb? If this were true, every foot-ball match would prove a veritable golgotha. The fact is that these sudden deaths are due to chemic deviation, as pointed out in these pages; the final collapse being due to a "short-circuit" of the nerve supply. Take an experienced locomotive engineer and start him on a hundred-mile run with a first-class engine and an alkali water, and the boiler will explode long before he reaches his destination—because the water in the gauge deceives him, owing to the chemic deviation in the water supply. And so it is in heart disease, the chemic deviation being found in the body fluids. Substantially the same principles apply in practically all constitutional maladies—the chemic deviation is the complication.

THE COMPLICATION IN CONSTITUTIONAL MALADIES.

PRINCIPLES OF MEDICAL TREATMENT.

DIABETES MELLITUS—Acidosis—Acid Excess—Indicanuria—Estimated Amount of Mineral Acids (Tabulation)—Diabetic Coma—Symptoms of Suboxidation—Anomalies of Function.

RHEUMATISM—The Chemic Deviation—Illustrative Cases—Lumbago—Sciatica.

GOUT AND LITHEMIA—Arthritis Deformans.

DISEASES OF BONE—Significance of Bone Disease—Growth and Development—The Binet Test—Mental Deficiency and Precocity (Tabulation)—Consecutive Ailments.

Having now sketched the relation of certain disorders of nutrition to magnesium infiltration, we might proceed at once to a study of nervous diseases were it not for the skepticism likely to be manifested by the superficial reader, who will freely criticise, because nothing definite and specific is said of this as a factor in constitutional maladies. Hence, it has been deemed wise and expedient to add a chapter for the special purpose of showing that magnesium infiltration is the complication in constitutional ailments. For example, when a patient has pneumonia, and pleurisy supervenes, the latter becomes a complication—and may prove the essential factor in leading to a fatal termination. In like manner, the glands of the neck may be infected during the course of diphtheria, and suppurate, a serious complication. An attack of influenza may give rise to neuritis, a complication far more difficult to treat successfully than the original malady. Following a surgical operation, erysipelas or sepsis develops, complications much more formidable than the operation itself, because they disorganize the harmonious physiologic and chemic relations and thus reduce the patient's vitality.

So, it is in respect to magnesium infiltration—invariably the complication in all constitutional maladies, and in most

instances, responsible for their appearance. That is to say, constitutional maladies develop consecutive to magnesium infiltration, whereas they do not arise in its absence, and besides, correction of the chemic deviation coupled with medical treatment to remove the cause, will mitigate their severity and also prevent their recurrence.

While these deductions are in accord with sound principles of logic, that the effect follows the cause, the apparent inconsistency in claiming that the "complication" is also the "cause" will but serve to strengthen our position—just as exceptions strengthen rules. As a rule, however, in medical practice, all physicians treat the disease without regard to the morbid complexus responsible for its appearance; hence, the lack of uniformity, not to mention the unfortunate mortuary statistics.

PRINCIPLES OF MEDICAL TREATMENT.

Let us consider briefly the principles which should govern medical treatment—not only in the case of constitutional maladies, but in all diseases, acute and chronic, functional and organic, including also in this category the effects or sequelæ of septic infection (bacterial invasion). To persons with the artistic sense, the symmetry and strength of Doric architecture compares favorably with the beauty and grace of the Corinthian style, while the Composite, which unites the attractive features of both the Corinthian and Ionic, also has its exponents and enthusiastic admirers—but all the beauty and symmetry and grace and strength in every architectural display are dependent upon the application of a simple mechanical principle, the keystone of the arch. A cursory glance at the statistics of modern commerce, colossal in magnitude as to money and bulk, and we are amazed at the wonderful achievements in transportation, through the application of another simple, mechanical principle, the flange on the wheel. And a critical study of the elements or factors which make for health and longevity shows that alkalescence of the body fluids and tissues is

the pivot or turning point upon which hinges all others. What the keystone of the arch is to architecture, alkalescence is to the human organism, giving it beauty and symmetry, and grace and strength. As in modern commerce, alkalescence is the flange on the wheel, enabling us to maintain health and promote longevity.

Having now solved the riddle of medical treatment, it will be in order to discuss some of the difficulties encountered in correcting or removing this ever-present complication—and the difficulties are real, if we aim to correct the chemic deviation and break up the “habit” of the system which has led to its production.

From the above remarks, the reader will readily comprehend the simplicity of the situation—that magnesium infiltration is one of the incidental effects arising from disorders of assimilation, primary and secondary, due to an excessive acidity (or diminished alkalinity); hence, the chemic deviation becomes part and parcel of all constitutional ailments. It is referred to here as the “complication” for the reason that it has hitherto escaped notice, notwithstanding the teachings of physiologists for generations that alkalescence was the normal status of the body fluids and tissues.

DIABETES MELLITUS.

In view of the serious character of diabetes mellitus we may assume that this constitutional malady presents or develops some of the difficulties encountered in relieving the “complication,” or mitigating its severity; hence, a comprehensive survey of the clinical and scientific facts relating to its presence and persistence, while confirming the claims advanced, may also relieve me from the onerous charge of medical transcendentalism. The truth in regard to these teachings is that they are inductive, the general principle having been demonstrated from a number of collated instances through an attribute or peculiarity common to all, that is, reasoning from the particular to the general. Of course, by deduction, reasoning from the

general to the particular, and arriving at the same conclusion, but confirms the induction—on the same basis that synthesis and analysis complement each other. Thus, by a single blow we strike out two bogies, transcendentalism and empiricism, neither of which should be allowed to complicate or interfere with modern science.

Acidosis is the term now employed to cover a pathologic condition arising from a disassimilation of the fatty acids—*butyric* or *acetic acid*—in the absence of carbohydrates, with the coincident appearance of acetone in the urine (*acetonuria*). The “acetone-bodies” appearing in the blood comprise a series, *oxybutyric acid* being the first member, from which both *diacetic acid* and *acetone* are derived, and either one, or more than one, may appear independently. The seriousness of diabetes is recognized by the daily amount excreted, but acetone occurs also in other diseases, though not to the same extent, and even appears in the urine during health. Children and young people are more liable to *acetonuria* during an attack of illness than adults who have previously enjoyed good health.

A radical change from a mixed diet to one composed exclusively of nitrogenous food will promptly cause *acetonuria*, although the condition gradually subsides without untoward consequences. Strange as it may appear, the *Esquimaux* do not have *acetonuria*, although living almost entirely upon animal food, a fact which leads to the deduction that this is a disease of modern civilization.

Whether the toxic action of acetone-bodies arises from a failure in the intra-cellular activity incident to diminished alkalinity of the blood, or from deficient oxygenation, we can trace the recuperative efforts of nature in supplying an alkali—*ammonia*—to neutralize the acid, but in this we recognize the absence of at least one important factor, a saline, whose special function is to maintain the bactericidal properties of the blood—John Hunter’s “living principle.”

Acid excess is employed here to cover a common condition in nearly all disorders, and may be determined by the use of litmus paper. Generally speaking, all disease is attended

with increased acidity of the urine, shown by the increased out-put of ammonia, but the cutaneous excretion is also acid, thus lessening the work of the kidneys. Night-sweats are said to be depressing to the patient, when as a matter of fact, they are distinctly beneficial, as they remove acid, allowing the blood to regain at least a portion of its alkalinity, and further, the sweating favors intestinal digestion, which requires an alkali or neutral media for its completion. It is not always practical, however, to test the bowel contents by an examination of the stools, because the acid mucus of the large intestine might lead to error, but we can form a reliable diagnosis by dipping a strip of litmus paper in water, and testing the skin, by having the patient take the moistened paper between the thumb and finger. Next, we compare this with the reaction of the salivary secretion, which should be neutral or alkaline.

The normal reaction of the skin is acid, and gives the blue litmus paper a slight redness, so that a bright pink discoloration indicates excess. Similarly, the salivary reaction is determined, acidity showing an over-flow and indicating that the intestinal digestion is correspondingly embarrassed.

While it is beyond the scope of this article to discuss the development of acid excess, it may be remarked that various acids occur even during health, phosphoric, hydrochloric, lactic, sulphuric, etc. Indeed, sulphuric acid and carbon dioxide perform important functions in the economy, the former acting upon the calcium salts to prevent premature crystallization as age advances, while the latter adapts them to the various reconstructive processes as demanded from day to day. Still, both are toxic. In the absence of sufficient alkali, sulphuric acid accumulates in the organism and causes death (Bunge), and this brings forward another factor for consideration, indicanuria.

Indicanuria is the name applied to a symptom of disordered metabolism, giving rise to the presence of indican in the urine. Usually, putrefactive decomposition of proteid substances takes place in the alimentary canal and is

attended with the formation or development of toxic products which find their way into the blood and lymph channels and lead to destruction of the hemoglobin along with serious disturbance of the liver function—possibly jaundice from occlusion of the bile-ducts. This condition may result from decomposition of indol and sulphuric acid alone, or a combination occurs which includes an atom of potassium, forming indoxyl-potassium sulphate, but urinalysis supplies no reliable criterion of its gravity, nor will laxatives and purgatives afford relief.

Now, bearing in mind sulphuric acid as a factor in diminishing the alkalinity of the blood and leading to the production of magnesium nucleo-proteids, and coupling this with its influence in the production of indicanuria together with the demand for alkalies in acidosis, the causative conditions may be arranged, as follows:

- (1) *Acidity*—from intestinal fermentation.
- (2) *Indicanuria*—from albuminoid decomposition.
- (3) *Acetone-bodies*—from disassimilation of fatty acids.

While substantially the same in kind, only differing in degree, they are all amenable to the general plan of treatment here outlined in conformity with the three cardinal principles already laid down—rehabilitation of the digestive capacity, neutralization of acid excess together with chemic dissociation of the magnesium salts, the object of all medical treatment being to restore normal cellular activity.

Defective assimilation being admitted, it is not difficult to determine the origin of excessive acidity—both mineral and organic acids being normal and essential constituents of the daily food. The accompanying estimate¹ gives the following amounts of mineral acids required per man per day, and to this tabulation I have added chlorin, a non-metallic element which performs an important function in the economy.

¹ Langworthy, Food Customs and Diet in American Homes, Washington, D. C., 1911.

ESTIMATED AMOUNT OF MINERAL ACIDS
(Required per man per day)

	Grains.	Grams.
Phosphoric acid (P_2O_5) . . .	45 to 60.0	3 to 4.0
Sulphuric acid (SO_3) . . .	30 to 52.5	2 to 3.5
Chlorin (Cl)	90 to 120.0	6 to 8.0

The above tabulation not only solves the mystery of excessive acidity as the dominating factor in disease, but it also throws a strong side-light upon the recent innovation, amounting to a craze, that of employing normal salt solution. While it is true that normal salt solution augments the bactericidal properties of the blood, its value is relative rather than absolute, because diminished alkalinity hinders oxygenation. Hence, the demand for complementary medication to neutralize acid excess—to restore the normal alkalinity of the blood and *make the cells work*.

Before leaving this topic, a word should be added relative to bacterial invasion, as it occurs in infectious and contagious diseases. While certain questions remain unsettled as to the peculiar activities of different pathogenic microorganisms, some being harmless but producing an active toxin, others being intra-cellular and beyond the reach of the known antagonists, such as leucocytes, antitoxins, bactericides, bacteriolysins, agglutinins and opsonins, experimental investigations have demonstrated that one of their chief functions is acid production—and further, that reproduction or multiplication is favored by an acid media. The deduction is warranted, therefore, that acid excess, or diminished alkalinity of the blood—and lymph—augments their activities, if it does not actually increase their virulence.

In proof of this assumption, we have but to consider the unsatisfactory results often attending antitoxin medication. The effect should be immediate and marked, while, on the contrary, the illness continues, debility is pronounced, and convalescence prolonged, all because suitable precautions are overlooked in not restoring the normal alkalinity of the body fluids and tissues. Thus, we are forced to the conclusion that in the treatment of disease, both infectious and

non-infectious, the neutralization of acid excess is of paramount importance—a fundamental principle which should be developed in the course of an examination.

Diabetic Coma.—In this disease it has been shown that fatty acids are responsible for the poisons which give rise to diabetic coma, and the employment of nitrogenous food has its limitations for the same reason. Both oxybutyric and diacetic acids abstract alkalies, chiefly ammonia, from the tissues, and as a consequence, the normal alkalinity of the blood is diminished with the coincident development of magnesium nucleo-proteids—leading to uremia. The percentage of nitrogen in the form of ammonia in the urine is often six times the normal amount, while that going to form urea is 25 per cent. less.

Symptoms of Suboxidation.—Associated with, or arising from, this condition, we meet with the usual symptoms of suboxidation, boils, abscesses, carbuncle, constipation, “nervousness,” and insomnia. While codeine and sodium bicarbonate serve to allay the more pronounced manifestations, they are not curative, because they do not modify nor hinder the progressive features of the malady, and besides, codeine given in increasing doses develops a habit, adding a factitious disease to that already established.

A tumor involving the integrity of the floor of the fourth ventricle demands surgical interference, and instances occur in which the pancreas is the original seat of the disease. In these instances, we might hazard the working hypothesis of magnesium infiltration, assuming that magnesium oxide unites chemically with the nerve colloids of the fourth ventricle, and a like chemic transformation involves the nervous mechanism of the islands of Langerhans (in the pancreas), when the chain of evidence is complete. As a matter of fact, treatment conducted upon this basis has shown such remarkable results that it would be unwise to draw conclusions, the number of cases, although typical, being too limited.

Numerous cases of diabetes are of alimentary origin exclusively and readily amenable to regulated diet, but even

here there is reason to believe that acidosis has already determined the magnesium diathesis—indicating a demand for improved nutrition of the nervous system—to *make the cells work*.

Again, I do not overlook the possibility of specific infection with gumma formation, but the fact remains that the results of medical treatment conducted with the object of correcting the defective assimilation by promoting dissociation of the magnesium salts, confirms the clinical diagnosis.

Anomalies of Function.—According to von Noorden (*Acid Auto-intoxication*, 1906, p. 67), we have to deal with the following anomalies of function:

- (1) Defective oxidation of carbohydrates.
- (2) Diminished fat formation from carbohydrates.
- (3) Impairment of the glycogenic function—and storage.

Treatment.—In a general way, it may be stated that no remedy or combination is more prompt or effective than calcium iodide conjointly with alkaline-saline medication, reinforced or guarded as required by the carbonate, sulphate or phosphate. Restlessness, insomnia, and all nervous symptoms disappear as if by magic; the digestive capacity is improved, and a sense of well being experienced; the urinary flow is gradually diminished, the percentage of sugar lessened, constipation is overcome, and last but not least, is the marked change for the better in the character of the circulation, notably the heart action and blood pressure.

It should be stated here, however, that the above outline does not cover the entire treatment of this disease, various intercurrent complications requiring special attention, and in addition, all iodine preparations have their limitations.

Suppurative conditions, such as boils, abscesses and carbuncle, are best treated by calcium sulphide; organized deposits, including gummata, atheroma and sclerosis are relieved by arsenic iodide; calcification is corrected by aromatic sulphuric acid, introducing a new chemic element, which requires discretion as well as chemic knowledge, but we must not overlook or neglect the demand for a

suitable calcium salt which shall enact the role of a reconstructive from a physiologic viewpoint, and at the same time, promote chemic metamorphosis—according to the law of mass—caution being necessary to avoid the formation of oxalates.

Where gout and rheumatism occur as complications of diabetes, the salicylates should be employed in alternation with the above treatment, but the scope of this article does not permit details—nor reference to organo-therapy. In conclusion, however, special attention should be directed to the evidence in favor of magnesium infiltration as the complication, involving as it does the nerve function of structures, the injury of which is known to be responsible for the appearance of glycosuria.

RHEUMATISM.

Rheumatism is a constitutional malady so common that it might be called “vulgar”—and the multiplicity of remedies advocated for its relief is bewildering. In point of frequency it occupies first place, and when we take into consideration the numerous sequelæ—heart disease, joint affections, muscular involvement together with the coincident and consecutive nervous manifestations, it seems remarkable that the “mystery” attending its appearance and persistence should not have been cleared up and the malady banished from modern civilization.

Affecting rich and poor alike, whether acute, subacute or chronic, it is always associated with one common, or shall we say, one universal symptom—excessive acidity. With a single exception, all treatment, ancient or modern is based upon this assumption; hence, all medication, as well as topical applications are employed under the impression that it can be “sweated out”—by hot baths, by counter-irritants, by wrapping the patients in blankets, by the use of dry or moist heat and by super-heating; and last, but not least, by internal medicines, acting as laxatives and purgatives and sudorifics and sialagogues and diuretics

and lithotriptics, along with anodynes, antiseptics and narcotics, all of which may be classed as super-serviceable.

The Chemic Deviation.—This is the common symptom, but we cannot say that acid excess is the cause, as otherwise every person who has indigestion would develop rheumatism. It may be safely claimed, however, that acid excess is the predisposing factor, and that as a result of some occult chemic changes, rheumatism follows. For example, we know that salicylic acid—in the form of oil of wintergreen—will afford relief when taken internally or applied locally. Where the patient is fairly well nourished, an acute attack is of short duration, sodium salicylate internally being quite sufficient to neutralize the effect of the rheumatic poison upon the nerves, the muscles and the joints. In debilitated subjects, those who have long suffered from acid excess, the disorder may persist for weeks, simply because the medical attendant has failed to grasp the significance of the chemic deviation, making no effort to restore the normal alkalescence of the body fluids and tissues.

It would be interesting to study the development of organic heart disease as a result of an acute attack of inflammatory rheumatism—due to the effect of rheumatic poison upon the lymphatics, so “very abundant” in the serous membrane or tissue lining the heart cavity and constituting also the pericardial sac in which it is enclosed, but it would require too much space to present a thoroughly convincing argument. Suffice it to say that many cases of well marked organic heart disease of recent origin can be relieved and cured by the treatment outlined for magnesium infiltration, special attention being given to maintaining the normal alkalescence, to chemic and physiologic stimulation of the lymph-glandular apparatus, together with internal remedies to promote magnesium dissociation.

Now, what is true of organic heart disease following rheumatism is particularly true with regard to stiff and swollen joints, because a joint is a less complicated mechanical contrivance and can be allowed to rest, so that the treatment as outlined amounts to a demonstration. When

muscles are involved, there are still fewer complications, treatment is simplified, and yet chronic muscular rheumatism appears to be omnipresent. Along with joint affections, subacute and chronic muscular rheumatism seems to be almost universal, and that too, without reason or excuse, since even the most persistent cases are readily amenable to treatment—which should be conducted for the purpose of correcting the chemic deviation (acid excess), and at the same time, removing the inorganic and *organic deposits* which impede, hinder or destroy the uninterrupted transmission of nerve impulses.

Illustrative Cases.—The following case records, published some years ago, will serve to demonstrate the correctness of the working hypothesis, although additional evidence could be advanced if deemed necessary. All that can be reasonably demanded is supplied in the complete demonstration of a fundamental principle.

One of my neighbors in the country, a farmer, had been laid up with rheumatism affecting one of his knees for several days, and was very much concerned because of his inability to get his crop of corn planted in time. He is about forty years of age and apparently in perfect health, so it seemed necessary only to administer a remedy which would promote the dissociation of magnesium salts and in addition, administer what would increase the liquidity of the blood, so I sent him iodo-calcium and rhus toxicodendron, small doses to be taken at short intervals, and as a result he was able to go ahead with his work on the following day and made a complete recovery.

Another case of acute articular rheumatism had a record of three weeks' confinement to the house. The patient, a man fifty years of age, had suffered from recurrent attacks of this character for many years. A test of the saliva showed acid reaction, and to overcome this difficulty he was advised to take the alkaline-saline treatment at short intervals, and as a result, he was able to attend to his regular business after a couple of days, without other treatment, but to counteract this acid excess and prevent the recurrence of rheumatic attacks he

received a week later, small doses of calcium carbonate combined with strychnine arsenite, and suffered no further inconvenience until about two years later, when he complained of slight cardiac embarrassment.

An examination of the heart showed well marked magnesium infiltration—the first sound fairly distinct, the second sound accentuated, and a small, frequent, almost receding pulse. Along with this was noted some unsteadiness in his gait, embarrassment of the respiration when attempting to use the arms, especially in lifting anything above the waist-line, with exaggerated knee-jerk, and a general feeling of “nervousness.” There was no acid excess shown by the saliva, but the cutaneous reaction was decidedly acid. For treatment, this patient received the alkaline-saline together with the same combination of calcium carbonate and strychnine arsenite previously mentioned, and all the untoward symptoms promptly disappeared. A year has elapsed, and there has been no return of the symptoms, either rheumatic, or “magnesia heart,” but I think this has been brought about to a large extent by the care which has been exercised in the matter of diet. He was advised to avoid oat-meal, other cereals, red meats, sweet potatoes, beans, veal, and crackers.

Lumbago is generally regarded as a form of rheumatism and is treated accordingly, with rather indifferent success. The diminished alkalescence is overlooked—when this is the chemic deviation responsible for its appearance. This is shown by the pronounced acidity of these subjects—and proved beyond question when recurrent attacks cease, when acidity is neutralized, and a regulated dietary adopted.

The following case is particularly interesting because of the veterinary system of treatment carried out:

A lady, over fifty years of age, suffered from recurrent attacks of lumbago, the last attack having been the most serious of all. In recounting her misfortune, she said it was necessary to give no less than three hypodermics, besides internal medication and wet cups. At the time of my first visit, she had

scarcely recovered from the effects of treatment, being unable to raise herself in bed, because of the stiffness of the lumbar muscles; there was no appetite, insomnia being persistent, with magnesia heart well marked; the patellar reflex was pronounced, and yet this patient made a prompt recovery in the course of a few days.

Treatment consisted in the administration of iodo-calcium in small doses, alkaline-saline at short intervals, and as soon as the acute symptoms had subsided, calcium carbonate was administered—in place of the iodide. I should add here that this lady, two weeks later, took an automobile ride, and became thoroughly chilled, the result being a recurrence of lumbago, but the treatment previously employed proved quite as effective as in the first instance.

Sciatica.—In the case of sciatica, it is always important to exclude infection from the stomach and bowels. As a rule, patients who suffer from sciatica are subject to putrefaction of albuminoids in the stomach or intestine, and nearly all of them have persistent intestinal fermentation, or even dilatation.

Two cases of this character are recalled, both men about fifty years of age, employed in-doors in the art department of a popular publication, and both have suffered six months or more from sciatica. In both instances the treatment consisted in the administration of the physiologic combination of which oxgall is the principal ingredient, the object of this treatment being to correct the gastro-intestinal irritation from indigestion, and in addition to this, both received rhux toxicodendron, small doses, three or four times a day, in the form of a tablet, and both recovered completely in less than a week.

GOUT AND LITHEMIA.

In the case of these two maladies, which are so closely allied to rheumatism, being marked by persistent and pronounced acidity (diminished alkalescence of the body fluids

and tissues), the general plan outlined for rheumatism is effective, but since cases of this character occur in which it appears as though these maladies might be due to some special cause, injury, disease, or occupation, it would not be profitable to divert attention by entering upon an extended discussion. It should be remarked in passing, however, that gout is presumed to be confined to a single joint, usually one of the great toes, but this is a mistaken notion, the "gouty heart" in Middlemarch being cited as an illustration. That the excessive formation of urates has an untoward effect upon the nerve mechanism is patent—similar to the irritability produced by the rheumatic poison, but what peculiar conditions, chemic or physiologic, turn the scale, now in producing rheumatism, and again, under apparently like circumstances, developing gout, is still an academic question.

While lithemia is akin to both gout and rheumatism, in this country at least, it is *sui generis*, leading to uric acid diathesis and neurasthenia. But involvement of the joints in uric acid diathesis is peculiar to this disorder alone, while neurasthenia is seldom a concomitant of rheumatism and gout, so in respect to these two diseases, the chemic problem in nutrition still remains unsolved.

Arthritis Deformans.—Usually, this disorder is assigned to lithemia, with uric acid causing deposits in and around the smaller joints, but we also have these deposits affecting the larger joints, and that, too, in the absence of lithemia—thus ossification of the joints may develop as a sequela of any serious illness, such as scarlet fever, rheumatism, typhoid fever, and a case has recently been reported where hardening of the muscles (ossification) followed hook-worm disease. When jarred by walking, which was accomplished with difficulty, the muscles would crack, and although the elbow- and finger-joints developed boil-like ulcerations, there was little or no pain.

A case similar to this, the joints alone being affected, came under observation some years ago. It is of sufficient importance to warrant republication, because it shows the

important function performed by calcium in disorders of nutrition.

A physician in general practice in one of our Western states wrote as follows:

"A peculiar case has recently come under observation. A lady, twenty-four years of age, married, finds all her joints becoming ankylosed, the wrists, ankles, and the neck, but she has no pain. The menses have always been scanty and stopped four months ago—so that there is complete amenorrhea. There is enlargement of the abdomen, but the patient is not enciente. The bowels are fairly regular, and while there is no well-defined cystitis, the patient has to urinate two or three times at night. Examination of the urine shows some excess of phosphates. The patient does not complain of the presence of gas or abdominal distension; the tongue is white, but not much coated, and she says that if it were not for her stiff joints she would feel perfectly well.

"The water in this State is distinctly alkali, and generally brings on an attack of diarrhea in the case of new-comers, severe enough to put them to bed."

At the expiration of four months, to a day, I received a second letter from this physician in which he stated that he had decided to act upon my published directions in regard to the use of calcium, and that he had administered large doses of the carbonate with beneficial results, as the patient had completely recovered. He also stated that he secures better results in nearly all cases when this calcium salt is liberally used. To quote from the letter:

"Very often, I get startling results from that alone, in chronic cases, of course. This is no doubt due to the fact that the water is very bad in this State and contains large quantities of magnesium.

Replying to this latter communication, I made the following observation: "I think your conclusion in regard to the deleterious effects of the water is correct, and to my mind it fully

bears out the statement of Professor Loew, regarding the advantages of administering lime in excess in the case of magnesium nucleo-proteids."

The analgesic effect of magnesium sulphate is usually sought by surgeons, large doses being given after all operations requiring anesthesia—which interferes with imbibition—on the plea that it is important to maintain an antiseptic condition of the alimentary canal by preventing accumulations. They know that these patients develop nervous manifestations—for relief of which bromides are given—that they show failure in nutrition—arrested imbibition—for which tonics are given—that this leads to a demand for laxatives, calomel and castor oil, showing clearly that the internal treatment is based upon erroneous premises—tradition rather than modern science. The employment of this salt defeats the very purpose for which it is used, and prolongs the period of convalescence—and besides, many operations are rendered useless because of the "disturbance" in the cellular activities incident to the presence of magnesium in excess. Physicians are generally culpable in this mismanagement and even defend their practice—on historical grounds and evident popularity. Some may be found who will admit that they knew it all the time, but had forgotten.

It will prove interesting and instructive to recall certain pronounced features in the case mentioned—the enlarged joints with absence of pain, the abdominal distension with regular bowel movements, the scanty menses and finally amenorrhea, the increased urinary flow, and particularly, the normal, mental poise—landmarks in studying the progressive character of the invasion or diathesis.

The importance of these symptoms it is difficult to estimate, since they are common in all disorders, where magnesium infiltration is not the frank, dominant symptom—in gout, rheumatism and uric acid with joint involvement, tabes mesentericus, spondylitis tuberculosa and neurasthenia with abdominal distension, scanty menses and increased renal action, but the most important is the fact that mentality

remained intact. Even a slight deviation from normal in the cellular activities, reversion, or retrograde metamorphosis with defective oxidation and impaired elimination might so hinder molecular changes as to produce a long train of untoward consequences, such for example, as neuralgia, neuritis, arterio-sclerosis with atheroma, leading to heart failure, cerebral apoplexy, or renal degeneration, and it is in the treatment of cases of this character where I expect to establish the physiologic basis in cell medication—cellular therapy—by the presentation of concrete examples of magnesium infiltration.

DISEASES OF BONE

Unfortunately for the rising generation, diseases of bone have not been given that consideration which their importance deserves, in evidence of which we only have to look at the number of flat-footed children on the public streets, or if they are not thus affected, they have twisted heels, and wherever this condition is found it may be accepted as a fairly reliable proposition that we have some spinal disorder, the most frequent being spondylitis or rarefying ostitis, although it is not uncommon to find curvature or “buckling” of the spine. If any further evidence is required, I have only to mention the popularity of braces, on one hand, and osteopathy on the other—conditions which clearly point to physical decadence in the rising generation. Several cases may be mentioned.

“Some years ago, a girl, seventeen years of age, came under observation with all the usual symptoms of Pott’s disease of the spine, there being displacement of three lumbar vertebræ, and for the two years preceding there has been an elevation of temperature nearly every afternoon. The patient appeared to be fairly well nourished but anemic, and of course, we have no medical treatment which can overcome this physical defect. It was a question between the employment of a jacket or brace

and osteopathic manipulations, and the mother decided upon the latter. Six or eight months later, I was again consulted in regard to the patient and found marked improvement in the position of the vertebræ, but there was still evidently some impaired nutrition—a lack of ability to stand continued exertion, occasions when despondency was marked, capricious appetite, persistent constipation, and various other manifestations which are so common when we have to deal with impaired nutrition.

Treatment in this case consisted chiefly in the administration of the oxgall combination previously mentioned, to improve the digestive capacity, but all forms of laxatives proved useless, the most efficient measure for overcoming the costive habit being found in calcium sulphate, administered in small doses. As a result of treatment this patient has now attained womanhood, and is a perfect picture of health.

Several years ago, I saw a girl, twelve years of age, from the South. She was developed physically to the age of sixteen, remarkably bright, but her mother said she could not enjoy play like other children. If she played for an hour or longer, she would come into the house and lie down on the sofa, and the temperature would run up to 100° F., and even without exercise not infrequently the temperature would go to 99.5° F. in the afternoon.

This patient also suffered from intestinal indigestion, so much so indeed that an operation for appendicitis had been performed six months previously. The mother seemed surprised that the operation for appendicitis had not caused a disappearance of the intestinal indigestion, and after examining the seat of operation, I turned the child over and discovered that the operation had been done on the wrong side, the lumbar vertebræ being displaced, and of course, my advice was disregarded. However, I learned six months later that the patient was condemned to have another operation done because it was a clear case of appendicitis. To this, of course, the mother objected, because it did not seem reasonable that a person

could have appendicitis after the appendix had been removed, and she then brought forward my exposition of the subject. The surgeon, after an examination of the spine, found the condition as I had stated, and adopted suitable measures for relief, so that the little girl, now a young lady, made a perfect recovery.

Under date of August 5, 1907, a boy, seventeen years of age, came under treatment for hip-joint disease. He had been compelled to use crutches for a year past. Both hip-joints had been operated on, the first at four years of age. He had been dismissed from a hospital about three weeks previous to this visit, where a plaster cast had been applied without benefit. In fact, the patient said he felt better before entering the hospital than when he left. The father told me that at both times when the operations were done an examination was made to determine the presence of tubercular infection, but the surgeons reported negative results. There was no elevation of temperature, and the patient appeared to be fairly well nourished for a growing boy. The left leg was the one most affected, and the pain in the left hip-joint was so great that he could not bear his weight upon it.

In this case it was not deemed necessary to administer alkaline-saline treatment, because the salivary and cutaneous reactions were normal. The oxgall combination was administered, and along with this, either calcium sulphate, calcium carbonate or calcium phosphate, for the reasons previously given, the object of medication being to restore directly the bone-tissue. As a result of treatment, he was able to ride a bicycle on September 28, using the right foot to propel the machine, and keeping the left on the opposite treadle in order to get muscular exercise of the affected limb.

The patient discontinued treatment in December, the last visit being made on December 16, so that he was under observation a little over four months, during which period I saw him seven times. His father told me later that the boy was in good health, and had discarded his crutches entirely since early in the spring, and when I expressed my surprise that he had made such a prompt recovery, he said, "Well, I'm satisfied."

Significance of Bone Disease.—This section would be incomplete without a brief comment relative to the significance of bone disease occurring in children and adolescents. Hitherto, many of these cases have been regarded as tubercular, and this was the diagnosis offered in the first case mentioned, by a popular consultant, his specialty being the treatment of deformities. In all such cases—rarefying osteitis—which is simply a wasting process, a “consumption” of bone material, we have tangible evidence, the disorder of nutrition being marked by visible and demonstrable effects. When we have to deal with the psychic element, in the form of mental deficiency, along with anemia, chlorosis, adenoids, catarrh, amenorrhea, chorea and “tantrums,” the connection is less distinct, so that medical treatment is conducted for the purpose of correcting an incidental factor, rather than for the purpose of restoring normal metabolism.

We must bear in mind that the off-tendency in early life—in both animals and plants—is toward acid excess; hence, there is a depletion of the lime content with replacement by magnesia—and the mystery is solved.

While various organizations are enthusiastically engaged in discussing “Child Welfare,” and have already accomplished much by their efforts to effect reforms in developing backward children, it must be apparent, from the published reports, that the active workers have failed to grasp the fundamental principles underlying mental deficiency. An editorial writer, referring to the proposed work of the recent Conference held in Philadelphia, criticises the “rating” system now in vogue for children unable to keep up with their classes, says:

They are not necessarily deficient mentally; they are merely slower to “catch-on” than others, but they constitute a drag on the work of an entire class.

Various plans for specially coaching such children have been advocated, but none has yet been shown to work as satisfactorily as could be desired. If, therefore, the coming Conference, bringing together as it will, numbers of the most

experienced educators, can evolve a direct and practical system whereby the slow child may be given the extra attention necessary to its proper advancement, and a system which, while it will not interfere with the regular working of the normal pupils, will yet provide against discouraging the sub-normal, it will accomplish something of particular merit, not alone to this city, but to the country as a whole.

The child who falls behind through no fault of his own during school days, often in later years, with proper environment, develops into an excellent citizen. But he should always have something like that proper environment while he is still young.

Here, it will be observed, is a well marked illustration of mis-directed energy—"trying to evolve a direct and practical system whereby the slow child may be given the extra attention necessary to its proper advancement," whereas these children could be promptly "developed" mentally by merely supplying them with a suitable lime salt—along with a properly regulated dietary.

Too much stress is laid upon the environment—to the neglect of diet. The most consummate alchemist must have an actual substance before undertaking his marvelous projects. We know something of the history of "making bricks without straw," and while it is accomplished successfully at the present day, we know more about chemistry and physiology; hence the folly and uselessness of attempting the impossible.

Growth and Development.—A study of the anomalies connected with physical growth and mental development will shed a ray of light upon this occult question—and explain how and why "the child who falls behind . . . often in later years . . . develops into an excellent citizen." In 1897, a young man, eighteen years of age, just out of grammar school, decided that he would like to go into business, found a position with a large and long established trust company, and asked for a recommendation, which was given. His school record was that of a reliable, but

very slow student. Gradually, as he attained his full growth, he was promoted from time to time, so that at the end of ten years he was appointed trust officer, and it is extremely doubtful if environment had anything to do with it—he was constantly under the criticism of his associates for his *persistent industry*.

Now, it is a well known fact that when children, boys as well as girls, take on rapid growth, they are “slow of comprehension,” often stupid, lacking in concentration and unable to remember lessons which they have learned “by heart”—when parents and teachers become alarmed for their welfare. The fact is that growth and development do not go hand in hand; there is frequently a “hitch,” due to lack of symmetry, chemic as well as physiologic deviation. Rapid growth means a demand for bone-making material in excess of the normal supply, and as a consequence, development of the nervous system lags, even without taking account of the off-tendency to acid excess. It is not unusual to find children, ten years of age with arrested growth quite as “forward” in their studies as others of fourteen and sixteen, where rapid growth has retarded development of the nervous mechanism.

Confirming these deductions are the clinical results attending treatment. Other things being equal—diet, environment and no hereditary encumbrances, we can correct the chemic deviation responsible for mental deficiency by employing suitable lime salts. Conversely, we can initiate physical growth, even in the case of precocious children, by precisely the same treatment. In the first instance, a substance is applied artificially to meet a demand of the system which nature—or indigestion—has failed to supply. In the latter case, we introduce a remedy which acts as a chemic stimulus, promoting dissociation of the magnesium salts—according to the law of mass action—which impair the functional activity of the body cells, by interfering with imbibition (absorption).

The Binet Test for feeble-minded children—and also applicable to normal children—consists of a scientifically

graded series of questions adapted to different ages. Thus, a normal child at three, four or five years of age should be able to answer intelligently certain questions adapted to the respective ages. Usually, these questions consist of a series of five, and when the child answers four of the five questions, it is said to be normal. However, should the child fail to answer four of the questions at the proper age, it goes back one or more years, this being determined by employing questions adapted to the lower grades. Should the child answer four of the questions for the physical age and any other five questions of a similar character, then this child is graded for one year extra; that is to say, it is precocious by one year. When the child answers ten questions in addition to the regulation series, then it is entitled to an extra grade of two years. And so the examination is conducted for the different ages.

It might be supposed that this system would lead to serious error, but fortunately, we have a fairly reliable guide which acts as a check—the child is asked certain questions in series beginning at an age which is known to be beyond his mental ability, and thus he drops back into the proper niche.

Mental Deficiency and Precocity.—In this connection should be mentioned the systematic work conducted by Goddard for the purpose of determining by means of the Binet test the mental deficiency and precocity of a large number of school children.

The investigations covered a system which included 5,000 population within a small city, and as many more outside, so that we have here both the city and country school population, in all about 2,000 children. The number of tests made together with the percentage of normal pupils as well as the percentage of deficient pupils is conveniently shown in the accompanying table.

TABLE SHOWING MENTAL DEFICIENCY AND PRECOCITY (GODDARD).

No. of Tests.	Normal.	Per cent.	Deficient.	Per cent.	Precocity.	Years.	Deficiency.	Years.
1547	554	35.8	993	64.2	329	1	312	1
					49	2	156	2
					14	3	79	3
					2	4	37	4
							8	5
							6	6
							1	7
					394		599	

For example, in this school population, the percentage of normal children was a little above 35, while the remainder, 64 per cent., were deficient; but among the normal we have quite a number who show precocity. Thus, 394 of the normal children showed precocity ranging from one to four years, while 599 showed deficiency, ranging from one to seven years.

So far as can be learned, these tests, as well as similar tests conducted for the purpose of determining the mentality of feeble-minded children, have all been conducted without regard to dietary investigations, and in view of the present tendency disclosed, relating to the employment of cereals and other food-stuffs containing magnesia in excess, it seems desirable that further investigation upon this important question should take into consideration the food problem, and the reader is therefore referred to the discussion along with the dietary studies which appears on page 92 *et seq.*

Now, it is not unlikely that these claims will be questioned; indeed, it is highly probable that the deductions will be classed as speculative therapeutics, or medical transcendentalism, being so far in advance of medical art that they possess merely a theoretical basis. Still, whatever is lacking in the line of evidence or proof may be readily found or discovered by any physician of ordinary intelligence, or by any experimental physiologist, notwithstanding the almost universal trend in teaching to the contrary. The main difficulty lies in the habit which has led to inactivity

regarding fundamental questions connected with the chemic problem in nutrition—and the prevalent tendency to rely upon tradition.

In this connection should be mentioned the excellent monograph by Langworthy,¹ in which he refers to the mineral matter required in the diet. He says:

Experimental investigations, particularly physiologic studies along these lines, are not very numerous . . . It is doubtful whether a moderate alteration in the absolute quantity or the mutual relations of the ash constituents of foods plays such an important part in nutrition as is sometimes claimed, but there is no doubt that in the long run the body must be supplied with the requisite amount of mineral matter of different sorts, in order that it may be normally nourished.

In this publication appears a tabulated estimate of the amount of mineral matter required per man per day, showing 0.7 to 1.0 gram (10.5 to 15 grains) calcium oxide, and 0.3 to 0.5 gram (4.5 to 7.5 grains) magnesium oxide, so that we have a fairly reliable guide for medication when it is desired to promote magnesium dissociation.

In the case of backward children, for example, we can administer calcium (lime) to the full limit of the daily ration, on the assumption that the chemic deviation interferes with or hinders the appropriation of this substance, the defect being traceable directly to the secondary assimilation, and ultimately to the nervous system. Correction of the defect—mental deficiency—by such means, even in a single instance, should be accepted as fairly good evidence that the deductions are warranted. When this procedure is equally successful in a series of consecutive cases, the problem is solved—since it shows that the ordinary lime content of the food is not available. How unfortunate then, the observation of our author, “a deficiency of calcium may be readily corrected by using larger amounts of milk and cheese.”

¹ Loc. cit.

The following record will serve to clear up this interesting question. The subject is a boy, 16 years of age, and within the last two years has taken on rapid growth. Although he is symmetrical and appears to be in perfect health, he is unable even with assistance to keep up with his class. The appetite is good, he sleeps well, and there are no bad habits to interfere with his studies.

In this instance the family table is liberal, even bountiful, but the breakfast is decidedly objectionable, cereals, fruit, and milk; hence, the necessity for correcting this error, which gives rise to the chemic deviation, as a preliminary to medication. Instructions were given to take breakfast first, then follow with the cereals, fruit, and milk.

Treatment, begun November 1, consisted in the employment of calcium carbonate (vitalized chalk) two and a half grains three times a day, in the form of a normal trituration, and in less than two weeks there was no demand for help with lessons. During the month of December, the patient had six grains twice daily, with a most satisfactory showing, his average for the month being 15 per cent. above any previous record—and that too, without assistance.

I cannot close this discussion without referring briefly to the recent announcement (*pronunciamento* ?), credited to Sir James Crichton-Browne, the eminent British savant. He has no fears for the backward child and declares "good food will brighten them to the normal standard," although he thinks precocity a bad sign, and that premature quickness often develops into later stupidity. Evidently, this manifesto appears as a *defense* of modern civilization, or an excuse for the short-comings of medical art—shown by the admission:

"Among ourselves here in England, some retardation of mental evolution is taking place, for the boys of a century ago of 14 or 15 years of age were educationally ahead of the boys of the same age today."

He says, "Our boys are backward in order that they may be

more forward later on," and cites the biologic law that the higher the organism, the longer it takes to attain maturity. Hence, the deduction: Should the chemic deviation responsible for backwardness in children remain unrecognized, England stands in line to produce a race of intellectual giants.

Like all other writers, Sir James deals in "glittering generalities." Thus, "Lack of proper feeding will, if long continued, permanently dwarf and damage the brain. We are sometimes told that the brain is the last organ to suffer from deprivation of food. My own conviction is that it is the first organ to suffer. Every brain-worker knows the dulling effect of the want of regular meals."

Now, in view of the peculiar chemic transformation—in respect to lime and magnesia—which occurs as a result of impairment of the digestive capacity (primary assimilation), the term "proper feeding" is too indefinite, and throughout this entire sketch, I have constantly and conscientiously aimed to develop the chemic deviation, the cases presented being singularly confirmatory of Sir James' contention, except that I do not limit the *effects* to the brain alone, but include the whole nerve mechanism.

Precocity has already been referred to, and would not be mentioned again, except for the sweeping condemnation of Sir James, as "a bad sign," when it is merely another signal from the same source—and due to like causes, similar, but not identical, although the same treatment is notably efficacious. This question is discussed under the head of "Growth and Development," and quite a number of typical cases have come under observation during the past twenty-five years which fully bear out the claims put forward. Unfortunately, however, unless some intercurrent malady supervenes, the medical attendant is rarely asked for advice, the parents regarding precocity as a fortuitous variation. Later in life, when the pendulum swings to the other side and stupidity develops, literally, when the magnesium nucleo-proteids cease to functionate, the only consolation is a belief in fore-ordination or retribution.

In conclusion, it is pertinent to remark that the degenerative changes mentioned will account for the frequency as well as the fatality of brain disease in this class of cases, while, at the same time, the general exposition of the subject reflects the line of treatment to be pursued.

Consecutive Ailments.—As a rule, we find that young persons suffering from impairment of nutrition in the skeleton develop various symptoms, such as anemia, catarrh, adenoids, etc., and are susceptible to colds, sore throat (tonsillitis), but it does not follow that these minor ailments always point to wasting of bone. It is true, however, that defective bone-formation brings out these consecutive ailments, although all belong to the same category.

Take the following case as an illustration:

A boy, twelve years old, is unable to keep up with all his studies, and his parents request and obtain a remission, but this does not overcome his mental apathy. Physical examination shows "hollow-back," due to displacement forward of the lumbar vertebræ. Even moderate exercise, such as walking, causes a peculiar sensation. He says, "It feels funny—just as if something was sticking me, and it tickles." He has to stop, and wants to sit down.

In a case of this character, the suggestion to employ internal treatment, to most physicians, would be regarded as absurd, and when parents are sufficiently interested, a jacket is applied, no attention being given to the chemic deviation which has brought about wasting of bone. In this instance, internal treatment—calcium carbonate—was continued for a time in addition to osteo-therapy with promising results, although the dietary was not altogether satisfactory. This was developed a year and a half later, when he joined a military camping party and gained seventeen pounds in less than two months—he was highly elated with the prospect of a ten-mile tramp daily. Previous to this outing, however, a marked change had taken place, physical and mental—the boy had displayed most remarkable talent, bordering on genius, and now comes the consecutive disorder, a broken arch, as a result of foot-ball.

Other cases, similar in character, might be quoted—for the purpose of tracing the relationship, or cause and effect, but it does not seem necessary for the intelligent reader who is sufficiently interested to become familiar with the corroborative evidence presented in these pages. The author assumes that sufficient evidence has been offered to confirm the contention that stability and permanency in health maintenance depend upon the integrity of the nerve mechanism, and he believes that a critical study of nerve conservation will demand a more thorough investigation of the chemic problem in nutrition.

THE COMPLICATION IN CONSTITUTIONAL MALADIES—CONTINUED.

SUPPURATION — Treatment — Abscess — Boils and Carbuncle — Organo-therapy.

CATARRH—Acute Catarrh—Bronchial Catarrh—Summer Catarrh—Stomach Catarrh—Intestinal Catarrh—General Remarks on Mucous Catarrh—Catarrhal Inflammation—Catarrh of the Bladder—Uterine Catarrh—Leucorrhea—Prostatorrhea—Intestinal Adhesions—Plastic Inflammation.

INFECTIOUS DISEASES — Bacteria — Ptomaines and Leucomaines — Microbic Digestion.

SUPPURATION.

For all practical purposes, the remarks in the preceding chapter might be regarded as an introduction to the study of suppurative conditions, a more common complication in disease than is generally supposed. In the case of diabetes, for example, no precautions are taken to prevent the development of this complication, and as a result, we have boils, abscesses, carbuncle and the like constantly developing. Notwithstanding this condition of affairs, no one has developed the prevision to point out that this tendency to suppuration may possibly go hand in hand with the diminished alkalinity of the blood—in diabetes, the alkalinity of the blood is diminished from 30 to 50 per cent., and necessarily this interferes with the functional activity of the lymph-glandular system, and here lies the key to the unfortunate concatenation of circumstances. In the case of rheumatism, where acid excess is the dominating factor, the joints frequently suffer, and it is not unusual to have patients recover with stiffened joints—this being largely due to the sluggish condition of the lymphatics, these vessels being “very abundant” in the synovial membranes.

In the case of gout and lithemia, with diminished alkal-escence of the body fluids, there is also found what might be termed a drying process, in which we have lymph-stasis, and as a result, there are deposits in and around the joints. Again, bone-wasting often leads to a form of suppuration—necrosis—or death of the bone-tissue, a complication which could not occur under normal conditions. Hence, the deduction regarding the constitutional effects of acid excess, and while the ineluctable nature of the task is forbidding, the evidence, physiologic and chemic, scientific and clinical, and even microscopic, confirms the working hypothesis, since all these various factors, when worked out, complement each other, forming a situation which is at once impregnable and unassailable.

Suppuration is substantially a decomposition of living tissues. Of course, bacterial invasion is a factor, persistent and relentless, but not necessarily fateful. Nature provides immunity in a degree, and when supplemented by science and art, we can promote recovery, because bacteria cannot subsist under normal conditions as regards chemic reactions.

Thus, we are brought face to face with questions relating to the inevitable conflict between health and disease—Why is suppuration? Necessarily, this answer should make inquiry as to the causative factor or factors. In general, we may assume that derangement of function is due to defective nerve conduction. This reply covers the ground in a general way, but it does not develop details; hence, it might appear too sweeping and untenable.

Let us examine this more carefully. First and foremost, we have to deal with acidity, a surplus of acid in the body fluids and tissues, interfering with the uninterrupted transmission of nerve impulses. In the second place, we have chemic deviations in the inorganic substances which enter into the composition of the tissues, whether these tissues be flesh or bone; thirdly, as a result of excessive acidity, together with the chemic deviations resulting therefrom, there is failure in absorption—impaired imbibition—the

cellular structures being unable to take up the necessary pabulum to maintain their integrity. And finally, as a result of this disordered metabolism, we have necrosis, or tissue death.

It will be observed, therefore, that all this harks back to impaired assimilation, primary and secondary, and it is extremely difficult to present consecutively the various steps demanded, if we expect and desire to restore the normal cellular activities. A physician, to comprehend the chemical problem in nutrition, must be able to recognize the expressions of the various deviations, and he must also be prepared to counteract or mitigate that which is most pressing. A quotation from John Locke (*Human Understanding*, 1829), will serve to illustrate the importance and necessity of having a thorough knowledge of the underlying principles which make for health and longevity:

“For example, in this proposition, that the three angles of a triangle are equal to two right ones, one who has seen and clearly perceived the demonstration of this truth, knows it to be true, when that demonstration is gone out of his mind; so that at present, it is not actually in view, and possibly cannot be recollected; but he knows it in a different way than what he did before. The agreement of the two ideas joined in that proposition is perceived, but it is by the intervention of other ideas than those which at first produced that perception. He remembers, *i. e.*, he knows (for remembrance is but the reviving of some past knowledge), that he was once certain of the truth of this proposition, that the three angles of a triangle are equal to two right ones. The immutability of the same relations between the same immutable things, is now the idea that shows him, that if the three angles of a triangle were once equal to two right ones, they will always be equal to two right ones. And hence, he comes to be certain, that what was once true in the case, is always true; what ideas once agreed, will always agree; and consequently, what he once knew to be true, he will always know to be true, as long as he can remember that he once knew it.”

Not only did Locke understand the value of fundamental knowledge, but he also recognized the difficulties in the way of applying recognized principles. For instance, in speaking of the lack of skill to use syllogisms, he says:

“There are those who cannot carry a train of consequences in their heads, nor weigh exactly the preponderancy of contrary proofs and testimonies, making every circumstance its due allowance. . . . There are some men of one, some but of two, syllogisms, and no more; and others who can advance but a step farther. These cannot always discern that side on which the strongest proofs lie; cannot constantly follow that which in itself is the more probable opinion.”

Experience has shown that Locke was right in another respect, where he says there is a lack of will to use knowledge or information. He says:

“There are another sort of people that want proofs, not because they are out of their reach, but because they will not use them.”

These teachings, while radical in character, are not revolutionary in the sense of being iconoclastic. The principles advanced have long been recognized as a part of our general scientific heritage; it is only in their classification, adaptation and application, that they are novel. While physicians here and there are ready and willing to adopt the principles advanced, as a rule, we find a great majority merely display an avuncular interest; they are neither pessimists nor agnostics, but they have neither the disposition nor the time to study the fundamental basis, and consequently, they cannot understand that the three angles of a triangle are equal to two right angles, except when brought to their attention in one particular way. In other words, they lack the capacity for entertaining more than a single syllogism at one and the same time.

Here is an illustration that will serve to confirm the

claims put forward in regard to excessive acidity. It has been found experimentally that removal of the parathyroids in animals produces a state of acidosis, and that the acidosis is responsible for the fatal outcome. When proper measures are taken to prevent or lessen the acidosis, the animals will live longer and *vice versa*. Thus, the average length of time, following parathyroidectomy is nine days, but it may be increased to twenty days by diminishing the acidosis; further, by increasing acidosis, the life of the animal is reduced to seven days.

Treatment.—In discussing the treatment of suppuration with magnesium infiltration as the complication in constitutional maladies, it will serve our purpose to point out the three cardinal principles to be followed, leaving for details the consideration of the various forms, types or varieties in which suppuration occurs. These three cardinal principles may be stated formally as follows:

- (1) *Neutralize acidity*—alkaline-saline medication.
- (2) *Stimulate the lymph-glandular system*—calcium sulphide.
- (3) *Promote magnesium dissociation*—calcium salts.

Abscess.—A technical description of abscess formation will answer as a means of illustrating suppuration wherever it occurs, because it covers the pathologic changes taking place in the tissues with and without the presence of bacteria. Abscess formation is due to local disorder, irritation of the tissues, and usually arises from the presence of bacteria. There is exudation—of serum with leucocytes, followed by colliquation necrosis or death of the cellular structures with the formation of a cavity containing pus—a liquid composed of liquor puris with many pus cells—dead as well as living leucocytes.

The phenomena attending pus-formation are easily recognized—heat, redness, pain, swelling, tenderness, softening, fluctuation and pointing, and on testing the salivary reaction, it is almost invariably acid, while the acid reaction of the skin is always pronounced. When the contents of

an abscess find access to the adjacent tissues—infiltration—constitutional reaction occurs; the pulse-rate is accelerated, temperature rises, the secretions are arrested, there is loss of appetite, and unless the pus-cavity is evacuated, chills, followed by sweating supervene—in other words, fever.

In the absence of bacteria, plastic inflammation may arise from local irritation or injury. Blood serum, along with leucocytes escaping from the vessels, form an “exudate,” when the fibrin causes adhesion between contiguous structures—viscera, muscles, etc. Under favorable conditions, the plastic exudate breaks down and is absorbed, while the reverse—acid excess—results in new fibro-connective tissue, when the adhesions become permanent, as is frequently the case after abdominal operations.

Special attention should be directed here to the ultimate effects upon the exudate—the contrast between the results obtained under normal conditions as regards chemic reactions, and that following excessive acidity, this being particularly noticeable after abdominal operations, referred to under the head of “adhesions,” later on.

The following case of *abscess*, reported some time ago, will serve to develop the advantages attending treatment conducted in accordance with the three cardinal principles mentioned above:

A young man, aged 27, walking with crutches, presented an interesting and instructive case of magnesium infiltration. He gave the following history: He had been under treatment for a period of thirty-one weeks, apparently the result of an internal abscess which “pointed” in the right groin. The first operation did not prove successful, and he was taken to the hospital where a second operation was done. The wound finally healed, leaving a considerable area of thickened and painful tissue, so much so that he was unable to bend the leg at the thigh without great pain. Tenderness in the hip-joint was so great that the slightest movement caused pain at the head of the bone; pressure over the joint externally was also painful, so that he had to be waited upon, being unable to dress and undress

himself. At the time of the first visit, he had been away from the hospital about two weeks, although during his stay in the hospital, five weeks in all, no medicine had been administered, a fact which is to be recorded in favor of the medical attendants, because they knew of nothing which could benefit him.

Treatment in this case was conducted for the purpose of promoting absorption of the plastic exudate which had involved the muscles, preventing movement, and in addition to this, it was necessary to correct the pronounced acid excess which had resulted from inactivity coupled with the bacterial infection incident to the abscess formation. The patient had suffered part of the time from night-sweats and even at the first consultation, he reported that any exertion caused profuse perspiration. This acid excess was readily determined by employing the litmus paper, testing the saliva as well as the perspiration.

To correct the suppurative tendency he was given the usual medicament which develops hydrogen sulphide (calcium sulphide), together with alkaline-saline, and as a result, the unnatural hardness began to subside. The pain in the hip-joint disappeared in the course of a few days, although the joint still remained tender, but the patient experienced quite a fright, owing to the swelling and numbness of the leg which supervened. However, it was explained that this was really a conservative process and would gradually subside.

The acid excess persistently continued, showing that nature was unable to provide the necessary lime salts, even with a good appetite, and as the suppurative tendency had been corrected, the treatment was modified by the substitution of the calcium carbonate, "vitalized chalk." At the end of six weeks, the patient had discarded the crutches, was using only a cane when he took long walks, and within a few days he returned to his former employment as an operative in a factory, this happy result having been secured and the cure completed after four consultations.

Contrast the results here with the experience of another young man, similarly affected, and living in the immediate

neighborhood. He had "hectic" fever, spent part of his time at home—where he could receive good attention—part of the time he was in the hospital under suspicion that he would get better attention, and finally, a year having elapsed, a consultant diagnosticated suppuration, operated and removed nearly a pint of pus. Recovery was uneventful but it required a year and a half instead of six weeks.

In this case, we have first to deal with bacterial infection in connection with the abscess, probably an abscess of the psoas muscle, and as in all such instances, where we have to deal with suppuration an acid condition attends, the physiologic equilibrium is upset, and so far, in our medical text-books, there is no treatment available except the employment of so-called "tonics." In fact, this line of treatment was recommended to the patient; he was advised to take treatment for a few months in another hospital, and as an inducement, he was told that he might expect to make a partial recovery in the course of a year. Confidentially, the patient's sister was told that her brother had hip-joint disease, and that it was tubercular and recovery doubtful.

A word in regard to the alkaline-saline treatment together with addition of chalk. The former restored the alkalinity of the blood, flushed the intercellular spaces and enabled the body cells to perform their functions under approximately normal conditions, while the calcium carbonate supplied the inorganic substance which the acid had filtered out, and besides, according to the law of mass, the magnesium oxide was reduced, changed or modified to such an extent that it no further acted as a bar to the uninterrupted transmission of nerve impulses.

Boils and Carbuncle.—Boils, abscesses, carbuncle and even so simple a disorder as a common cold, are readily amenable to the alkaline-saline treatment, calcium sulphide in small doses being a remedy superior to any hitherto offered as a substitute. Still, it is lacking in efficiency without attention to the salivary and cutaneous reactions. Some years ago, I prescribed for a lady who had recurrent attacks of boils.

She told me she had as many as sixty at one time on her forearm, and she was then beginning to have a new crop, starting with a dozen or more. The treatment here outlined proved successful and satisfactory in this case, and yet there was a high specific gravity of the urine together with glucose.

As a further proof of the value of this simple remedy in cases of this character, I may cite here the case of a gentleman, 40 years of age, who had for a week or more been poulticing a substantial looking boil on the right side of his neck. I advised discarding the poultice altogether, positively forbade squeezing the boil, and prescribed calcium sulphide in small doses. At the end of the week, when I next saw him, he told me that the boil discharged profusely through four separate openings and that he thought something was wrong, as the discharge had entirely ceased. A week or ten days later, the "carbuncle" had healed entirely, showing only a perceptible scar.

A young lady came under observation for rheumatism (?) affecting the eyeball. She had suffered from an attack of rheumatism and in some way during her stay at the hospital her eye had become affected, and as a consequence, it was very much swollen, blood-shot, and there was marked photophobia. Calcium sulphide and the alkaline-saline treatment relieved this condition in the course of a week or ten days.

Another case is that of a boy attending school, who had met with his third accident in ball-playing. The eye was notably disfigured and the surgeon at the institution told him he would probably lose his eye-sight, but calcium sulphide relieved the whole trouble in the course of a week or ten days, leaving the eye in a perfectly normal condition.

While it is true these are not typical cases of magnesium infiltration, it must be admitted that being due to pyogenic infection, there is a disturbance in tissue change giving rise to acid excess, and by showing the availability of simple alkaline-saline treatment, an important advance has been made in the demonstration—because calcium sulphide is

not an antiseptic, its utility being due to its action as a lymph-glandular stimulant, and its influence in neutralizing acids which interfere with normal cellular activity.

Organo-therapy.—Before proceeding further with our present study it will be interesting and instructive to consider the advantages offered by modern science in the treatment of boils, carbuncle, acne, and other purulent processes by means of bacterial vaccines. In explanation of this method, it should be stated that the bacteria used in preparing these vaccines are taken from the actual cases of the disease; that is, the original bacteria are isolated from the pus, grown upon cultures, and they are then used hypodermically for the treatment of suppurative conditions.

Ordinarily, three separate injections are required in an average case, the initial dose being 100,000,000 to 150,000,000. This is followed at intervals of six days by two more injections ranging from 200,000,000 to 250,000,000 and 300,000,000 to 400,000,000 microörganisms, respectively. That is to say, the bacterial infection found in boils, abscesses, carbuncle, etc., is reproduced in the form of pure cultures, and in this condition they are introduced into the circulation at intervals of six days.

In view of the time required together with the possibility of the system being in such a condition that there is no favorable reaction, it seems scarcely a promising method of treatment—at least, it looks so to the writer when curative effects may be secured in much less time, by simply complying with the directions given above respecting the cardinal principles to be observed.

This claim is well illustrated in the case of a patient brought to my attention by a medical acquaintance who frequently called upon me socially, and occasionally asked for suggestions in regard to some difficult case.

One day he told me about a patient, a lady, over 80 years of age, who was then suffering from carbuncle, and he says, "Of course, she can't live. This has been going on now for two weeks. The carbuncle is located on the back just below the

neck, and there are no less than fourteen openings, all of them showing decomposition."

I said, "Doctor, you should adopt the following measures: Neutralize the acidity by alkaline-saline medication, stimulate the lymphatics, by means of calcium sulphide, and for local treatment use hydrogen superoxide in the form of a spray."

The subject had passed from mind until a week later, when the doctor came bustling in, saying, "You done it! You done it!", and when asked for an explanation, he reported that the patient was rapidly recovering, and that the treatment had shown almost immediate results.

Another physician of my acquaintance who was persuaded to take up with the suggestion, complained about the rapidity of improvement, and said he could hardly afford to treat patients like that. He said he was called some distance to see a case of carbuncle, and decided to adopt the plan as recommended. He told the patient that he would not return until the second day following, and at that time he found a cavity large enough to put a goose-egg in, but no further visits were required.

CATARRH.

Catarrh is substantially a suppurative process. Not only is it a predisposing factor in constitutional disorders, but it is frequently an exciting factor in many instances. Thus, nasal catarrh, by extension, may give rise to suppuration followed by deafness, or tonsillitis, with involvement of the kidneys, the heart or the appendix. Catarrh of the stomach or intestine leads to the absorption of poisonous substances which interfere with nerve function. So, catarrh of the uterus and bladder likewise develop their train of symptoms, and while these various catarrhs with their concomitants and symptoms are treated as entities, they are merely local manifestations of constitutional derangement.

When systemic treatment is inaugurated, they disappear, provided this treatment includes medication to correct the chemic deviation—as well as the effects arising therefrom.

In other words, we must observe the three cardinal principles laid down. To do one thing and leave the others undone is not enough—we must neutralize acid excess, stimulate the lymph-glandular apparatus, and above all, we must remove the effects of chemic deviation, the constant and persistent complication in this class of cases. A brief summary of individual cases will prove helpful.

Acute Catarrh.—When persons take “cold,” they are said to suffer from acute catarrh. Even when a person is enjoying perfect health, some exposure may result in causing congestion of the mucous membrane of the nasal cavity, and following this congestion, we have absorption of poisons in the form of bacteria and their toxins. Still, acute catarrh is not a serious malady when the proper and necessary precautions are taken to prevent the multiplication and absorption of these toxins. For example, when bacteria find a suitable nidus or culture field in the nasal secretions, they multiply rapidly. This can be readily corrected by the employment of suitable local antiseptics, when the cold, or acute catarrh subsides. By means of the static electric machine, we can produce ozone, and when this is carried directly to the mucous lining of the nasal cavity, the cold disappears, a seance of five minutes being quite sufficient to effect a cure.

In the case of chronic nasal catarrh, we have a constant source of irritation from the presence of bacteria and their toxins, and it is not unusual to find extension of the catarrh to the middle ear, producing deafness, temporary or permanent. A case of this character recently came under observation.

A young man, 26 years of age, has been under treatment for catarrh with deafness for the past three years. His physician has been making local applications of watery solutions to the nasal cavity as well as to the ear twice a week, without results. The patient thinks these local applications just the thing, and when I told him that they were unnecessary, he seemed rather disappointed.

Treatment of this case consisted in the employment of local antiseptics in oily solution with internal treatment for the purpose of correcting the effects of long continued chemic deviation, the salivary secretion being distinctly acid, and of course, the patient was given suitable directions in regard to diet. Beginning treatment, the hearing on the right ear was practically absent; on the left ear he could hear a watch at the distance of five inches. At the expiration of six weeks, this patient could hear a watch on the right ear at a distance of two inches, and the left ear was good for twenty-four inches.

Bronchial Catarrh.—As a result of delayed, difficult, or impaired digestion, it frequently happens that a catarrhal condition develops. In the case of the bronchial apparatus, we may have catarrh with atrophy, or on the other hand, it may be characterized by more or less congestion with thickening—substantially a fibrosis. Under either condition, we may trace a catarrhal process directly to acid excess arising from the indigestion, followed by magnesium infiltration incident to the lime depletion, and as a rule, we are frequently confronted with distinct neurasthenic symptoms which fail to respond to the usual anodyne-hypnotic treatment. Neither will diet, and rest, and baths, and electricity, and foreign travel, and sleeping out-of-doors, and enemata and hill-climbing and water-cures, and a hundred other schemes serve to rehabilitate the condition of the patient—by reëstablishing a healthy state of the digestive apparatus.

This topic will be considered more in detail when discussing intestinal catarrh, but we may take a glimpse of the situation in passing. Like nasal catarrh, bronchial catarrh is a coccus infection—and intestinal indigestion contributes largely to the debility, because during the intervals of digestion the lacteals are constantly taking up poisons (bacteria or their toxins), which are carried, through the medium of the thoracic duct, directly into the general circulation.

In proof of this we have but to point to the recurrence of cough after eating—and the wiseacres will insist that the

material expectorated comes from the stomach rather than from the bronchial tubes. They cannot comprehend the theory of physiologic equilibrium, that when digestion begins there is a current flowing into the stomach, and at the same time, an out-flowing current from the intestine, this out-flow from the intestine being carried directly into the circulation, when nature makes an effort to eliminate the toxins while the blood is passing through the pulmonary apparatus. Bronchial catarrh, therefore, demands attention to the intestinal digestion as well as to the irritation set up in the bronchial tubes, but when bronchial catarrh has long continued, we have the magnesium infiltration to deal with as the complication.

This is well illustrated in the case of a young man whom I treated for tuberculosis in the winter of 1903-04. At that time, he was 19 years of age, and had been under treatment for two years, and although his doctor sent his sputum to the Board of Health several times, he always failed to get a report. Being discouraged from the unsatisfactory results of treatment, the boy's mother went to the office, and found the records with a positive diagnosis. It was not a serious case, although the boy was anemic, and had the peculiar cachectic facies. Active treatment was begun, and an examination of the sputum seven days later proved negative, and a second examination three weeks after beginning treatment was also negative, and there were no further symptoms of tuberculosis, until four years later. He came to the office one day and said, "Well, I guess I am back in the old condition." He said he had been under treatment during the winter, and that the principal medication which he had consisted of Epsom salts. The cough and expectoration were exceedingly unpromising factors, but I told him it would be necessary to have an examination of the sputum. Fortunately, this examination showed no tubercular bacilli, only coccus infection, and as it was a chronic ailment, treatment was conducted for the purpose of promoting magnesium dissociation, in addition to regulation of the diet, and in the course of a few weeks, all unfavorable symptoms disappeared, the

patient gained weight and strength and there has been no recurrence.

Another case, similar in character, was that of a man over fifty years of age, who was satisfied that he had tuberculosis, but examination of the sputum showed that there were no tubercular bacilli. The same treatment was carried out in this case with very satisfactory results, except that longer time was required, owing to the fact that this patient had previously suffered from recurrent attacks of rheumatism, and acid excess was persistent, notwithstanding the continued employment of alkaline-saline medication.

Summer catarrh, or autumnal fever, is almost universal—at least this is true of this section of the country, and from reports in current literature, I am inclined to believe that the same condition prevails throughout the United States. Nevertheless, it is a very fact that these cases of summer catarrh, or summer colds, as they are called, receive the same treatment as that which is employed during the winter months. In these cases the atmospheric conditions should be regarded as an exciting factor, and of course, in addition to this, we have the coccus infection, but usually the symptoms disappear with the appearance of cold weather, and in my experience, even intelligent people must have recurrent attacks for several years before they are convinced, and insist upon the usual cough remedies for treatment.

It would be foreign to my purpose to discuss more fully the subject of autumnal fever, because this would naturally lead to a discussion of the causative factors as well as the treatment of hay-asthma.

Stomach catarrh is usually a secondary disorder. That is, it does not develop like catarrh affecting the mucous membranes generally, for the reason that the mucous membrane of the stomach is normally adapted to the acid reaction incident to digestion; hence, we find that many persons will suffer from intestinal indigestion long before the stomach makes complaint. Another reason lies in the natural disposition of those who suffer from hyper-chloridia, to avoid

meats, and live principally upon starchy foods. When they suffer from irritation of the stomach, gas, or water-brash, they resort to bicarbonate of soda, and since this relieves them temporarily, they feel they have accomplished something for their welfare, at the same time cheating the doctor. They do not realize that this bicarbonate of soda only adds to their misery, because the chlorin of the daily food combines with the sodium and lactic acid of the starchy foods to make more hydrochloric acid.

As a rule, we find that catarrh of the stomach is usually overlooked, owing to derangement of the liver function as a result of the acid excess which leads to "biliousness," and not infrequently, jaundice, so that for all practical purposes, we may put forward the proposition that catarrh of the stomach as well as gastritis, acute, subacute and chronic, are all due to chemic deviation, and until we can correct or remove the effects of this chemic deviation, no progress will be made toward recovery.

A word should be added relative to one very common condition attending catarrh of the stomach, distension or even dilatation, this being due to the obstruction in the circulation—we might say the stagnant or embarrassed condition of the circulation in the walls of the stomach, owing to the deranged liver function. The blood cannot "flow" from the walls of the stomach to the liver, that organ being unable to receive it. As a consequence, the blood passing through the walls of the stomach contains an insufficient amount of pabulum to produce the proper digestive fluid together with the small percentage of hydrochloric acid.

The result of this is that we have to deal with delayed digestion, and delayed digestion means decomposition with a rapid multiplication of bacteria, all of which produces more or less gas. The patient then complains of pain around the heart, and is treated for heart disease. In case, however, there is a surplus development of hydrochloric acid (hyper-chloridia), the patient complains of water-brash, and thus the vicious circle is complete—gas or water-brash

from catarrh of the stomach, and not infrequently, ulcer, and along with this, we have neurasthenia. How dangerous, then, the employment of peroxide of hydrogen, under the advice of an amateur, to produce more gas with rapid oxidation, leading to rupture of the walls of the stomach. It is on a par with administering separately the two parts of a Seidlitz powder.

The following case will illustrate the futility and shortcomings of the most approved neurologic treatment carried on for a period of ten years:

The patient, a gentleman, 62 years of age, engaged in mercantile business where large financial deals are the rule, has become very despondent in consequence of failure in the digestive capacity. While this patient is not emaciated, he looks careworn and is prematurely aged, and notwithstanding various experiments regarding diet, including also an exclusive milk diet, it seems impossible for him to regain strength, so that his step will be firm and his movements characterized by the buoyancy which he would like to possess. An examination of the tongue showed that this organ was small and white, but not coated, indicating anemia, but he told me that ferruginous medication had utterly failed to produce appreciable benefit.

Further investigation, together with an urinary examination, led to the conclusion that this man was suffering from premature calcification along with atrophy affecting the gastrointestinal tract, and treatment, aromatic sulphuric acid, apparently confirmed the diagnosis, as the patient showed immediate and marked improvement, and in a few days had regained his normal condition, except, of course, that he had not increased much in weight.

Unfortunately, this patient manifested distinct neurasthenic symptoms—in desiring to take an active part in the treatment, but as we could not agree on that score, treatment was discontinued. I hear from him occasionally, when he requests the prescription renewed for the medicine which he thought produced the most apparent benefit—the oxgall combination.

A case which well illustrates the manifestations incident to "biliousness" came under observation in 1907:

One of my patients living at a distance, asked me to prescribe for his sister, "suffering from biliousness and the general effects of a slow liver," giving the following information: "The principal trouble from which she is now suffering is "tremulousness," which has so much increased in the past year that she is scarcely able to use her hands at all. All of my brothers and sisters suffer from it, and it grows worse as they grow older. My sister being about 70 years old, I fear it cannot be checked. It is with much difficulty that she can dress herself, or even comb her hair. Otherwise, she has a good constitution and her appetite is good.

"If you think anything can be done to ameliorate her malady, I would be rejoiced to have you prescribe for her."

Treatment of this patient consisted in the employment of calcium iodide, in small doses together with the alkaline-saline medication already described, and resulted in a complete cure, not only of the biliousness from which she suffered as a result of chronic indigestion, but also from the "tremulousness."

Intestinal Catarrh.—In studying the symptoms and causative factors responsible for intestinal catarrh, we must bear in mind nature's provision against this acid excess, which we have put forward as the dominating factor in producing magnesium infiltration. I refer, of course, to the acid mucus, which is the normal secretion of all the mucous membranes; and in addition to this, we must bear in mind that for all practical purposes the mucous membrane is continuous, and hence, there is necessarily, a sympathetic influence—that is, where we have catarrh of one mucous membrane such as that of the nasal cavity, we are almost certain to have a corresponding disorder involving the mucous membrane elsewhere. In the case of intestinal catarrh, the conditions are somewhat different, from the fact that we can trace catarrh in other mucous membranes directly to the disordered condition of the intestinal tract.

The symptoms of intestinal catarrh are so numerous and varied that it would be unprofitable to undertake a systematic exposition of their peculiar manifestations, so in the present instance, an effort will be made to point out some of those most prominent, at the same time, indicating their significance. In the first place, it should be understood that intestinal catarrh is a part and parcel of constitutional derangement, because when we undertake a critical investigation of the various questions, we are brought back to the intestinal tract as the centre of radiation.

The fact is that nutrition depends upon the integrity of the intestinal digestion, and therefore, we can understand how fruitless will be our efforts to correct the disorders of the intestine due to hyper-chloridia. Add to this, the presence of bacteria as a factor, not only liable, but likely to be taken into the general circulation, together with their toxins, during the intervals of digestion, and we can readily understand how this may affect not only the mucous membrane of the stomach, but practically the mucous tissue of the entire body. Thus, these mucous tissues are notably vascular, that is, they contain numerous vessels, arteries, capillaries, veins, and lymphatics, and when the mucous membrane of the nasal cavity is exposed to irritation from without, we can understand how nasal catarrh is likely to be one of the first, if not the central manifestation of disordered intestinal digestion.

Again, we must consider the disorders of the liver as a factor in producing intestinal catarrh, because this organ is particularly if not especially engaged in neutralizing poisons which may find their way into the circulation. For example, if the bile is not regularly discharged, there is failure in digestion of fats, and this is followed by decomposition, with the formation of various poisons or toxins, so that nerve sensation is obtunded, leading to impaction, or even obstruction of the bowel.

One of the most important factors connected with intestinal catarrh relates to the "sluggish" condition of the lymph-glandular apparatus, and here an explanation might

be offered. For instance, it will be said that if the lymph-glandular apparatus, the lymph vessels and the glands, are in a sluggish condition, they will not be likely to carry poisons from the intestinal tract, but the contrary is true. This is due to the fact that when lymph alkalescence is diminished, glandular activity is lessened, and consequently, there is a paucity of lymphocytes, the white blood corpuscles, which it is the function of these glands to produce.

Another factor is constipation, and from the preceding remarks, the reader will readily comprehend the conditions responsible for this symptom—diminished alkalescence of the body fluids and tissues, together with depletion of the lime content and the consecutive formation of magnesium nucleo-proteids which lack the property of imbibition (absorption). This finds a remarkable illustration in the case of sudden attacks, and even in chronic cases of appendicitis. There is a catarrhal condition of the bowel, together with an excessive bacterial flora, along with constipation, with distension, or even dilatation; the lymph vessels will fail to counteract, neutralize or interfere with the absorption of poisons or toxins—and the result is suppuration, which demands immediate operation.

There is no doubt but that many persons with intestinal indigestion court a visit to the hospital for removal of the appendix, simply because they have this hyperacidity, with the magnesium infiltration. An interesting case of this character came under observation some years ago, and will serve to confirm the claims here set forth.

The subject was a man, 45 years of age, a hard-working blacksmith, and seemed to take pride in reporting that he had had two attacks of *catarrhal appendicitis*, and that the doctor told him he must go to the hospital for an operation when the next one occurred. And yet, with the most simple remedial measures this patient made a rapid recovery, gained weight and strength, and although quite a number of years have elapsed, he has not yet been compelled to take the proposed hospital trip—because he has enjoyed perfect health, and what

is more to the point, he has learned how to regulate his diet, and thus avoid intestinal indigestion.

And this brings us to the most important question relating to intestinal catarrh. The great difficulty lies in the lack of digestive capacity in the intestinal tract, and sad to say our present mode of living but adds fuel to the flame.

While taking lunch with a gentleman several years ago (1905), he told me with some degree of pride that he had suffered twenty-nine years from intestinal trouble, the attacks coming on at the most unexpected moments. In detail, I was permitted to learn the circumstances attending these attacks, when several hours would be occupied rolling about on the office-floor, notwithstanding the fact that a mixture of laudanum and chloroform was "handy" in one vest-pocket, and a box of codeine tablets in the other.

Asked about his habits regarding breakfast, he said he was very careful about his breakfast, and seemed greatly surprised that his trouble began at the breakfast table. "Sloppy" foods were positively interdicted and a dry diet insisted upon, liquids to be taken only at the end of the meal. Medication consisted in the conjoint administration of calcium sulphide and copper arsenite in small doses, and as a result, nearly all the symptoms had disappeared within three days, and although the medicine has been but rarely employed since, there has been no actual recurrence.

The magnesium infiltration in this case evidently affected a small loop of the intestine and had given rise to more or less catarrh and possibly adhesions, but the simple treatment recommended proved entirely successful in correcting the disorder.

General Remarks on Mucous Catarrh.—Having now shown why and how suppuration occurs, it will be in order to consider briefly a number of the forms or varieties of catarrh, together with suggestions relating to treatment.

Catarrhal inflammation of a mucous surface is characterized by a fluid exudation consisting of mucus, leucocytes and desquamated epithelial cells in varying proportions, the affected area being red, swollen, and bathed by the exudate.

In the case of *catarrh of the bladder*, which generally produces sufficient irritation to be designated cystitis, the first and most important difficulty to correct is the hyperacidity, because this produces an irritation of the delicate mucous membrane. Next in order, we have to take into consideration the dangers arising from intestinal catarrh or intestinal indigestion, because as has been pointed out, the intestinal catarrh leads to the absorption of poisons or toxins.

Catarrh of the bladder may occur under two different forms, acute and chronic. A case of the acute variety came under observation early in my professional career and the "cure" was so rapid that the patient's friends doubted that he had been sick, and his employers were suspicious that he was a malingerer. This patient, a man about 35 years of age, had been taken ill Saturday morning, and had to be carried home. The doctor in attendance prescribed the usual remedies during the day Saturday and on Sunday, but there was no relief afforded even from anodynes, and I was called in consultation. It was learned that the man's occupation was that of a driver. He was hauling damp saw-dust on a cold day in an open wagon, and sitting on the load, and of course, this had the effect of chilling the bladder and causing the congestion.

A consultation occurred between nine and ten o'clock Monday morning, and the treatment recommended consisted in hot sitz-baths, either continuous or at short intervals. As a result of treatment, he was ready to go to work in the afternoon, and waved a salutation as he passed me a little after one o'clock.

In chronic cases, especially in advanced age, we have a more serious problem to deal with owing to the acidity, the sluggish condition of the lymphatics, together with thickening, and to this should be added involvement of the nerve supply by the magnesium deposits. However, the difficulties

are not insuperable, provided attention has been given to the dietary, along with medication to counteract the hyperacidity.

In the case of women, it is not unusual to have catarrh of the bladder as a result of the relaxed condition of the pelvic tissues, and of course, we have the magnesium infiltration to contend with, because that is essentially the effect which has followed long continued acid excess. Relaxation of the pelvic tissues gives rise to displacement or prolapsus of the uterus, and this organ being attached to the bladder, causes more or less displacement, so that it is not properly emptied. As a consequence, we have ammoniacal decomposition together with thickening and painful contractions of the organ.

In all these instances, there can be no doubt of the advantages arising from irrigation as well as from internal medication conducted for the purpose of promoting an antiseptic condition of the cavity, and as temporary expedients, they are of distinct value, but they do not afford permanency. This can be secured only through the means and medication already indicated—neutralizing acid excess, counteracting the tendency to suppuration, and promoting magnesium dissociation.

Uterine Catarrh.—While a discussion upon *uterine catarrh* may seem like trenching on the surgeon's domain, nevertheless, the information to be acquired therefrom is quite as valuable to the surgeon *after* an abdominal operation, as it promises to be for the physician as a prophylactic—if he would use it. Studied from a mechanical viewpoint we can readily understand the favorable conditions for displacement, and when to this is added the certainty of consecutive physiologic derangements, the frequency of uterine catarrh is no longer a mystery. In addition to this, however, we must consider the peculiarity of its functional activity together with the known sympathetic susceptibility to the catarrhal process.

Unlike the heart, the stomach, the kidneys, the spleen, also the pulmonary apparatus, all of them organs in constant

activity, the uterus remains practically dormant at least half the time. During the period of functional activity incident to the menstrual molimen, there is active, followed by passive, congestion, and with impairment in the lymph-glandular apparatus, due to acid excess, there is always more or less inflammatory reaction—with exudation. With defective oxidation, the exudate becomes a centre of irritation, and may possibly give rise to the development of fibroid tissue. As a result, fibroid tissue grows, or reproduces itself just like normal tissue, and thus we begin to penetrate the genesis as well as the pathology of *fibroid tumors*—and besides, we can realize or understand why fibroids do not involve the other organs mentioned as they do the uterus.

Perhaps it should be added that fibrosis or thickening does affect the lungs, as in fibroid tuberculosis. A condition similar to this may involve the liver (cirrhosis), and also the kidneys, in the form of contracted kidney, but the causative factors are not essentially different—acid excess with magnesium infiltration as the complication—and the principles apply with equal force in myxedema, cardiac hypertrophy, arterio-sclerosis and arthritis deformans.

The record of a typical case of this character (uterine catarrh) will suffice to show the special and peculiar features to be observed in such instances, demonstrating at the same time the efficiency and simplicity of the treatment advocated.

The patient, a married woman, 27 years of age, had separated from her husband, being convinced that she had contracted venereal disease from him. She had been so unfortunate as to take a course of treatment at the hands of an irregular practitioner, who encouraged her in the delusion—for such it proved to be, as an examination of the vaginal secretions for gonococcus showed negative results.

Subjective symptoms included insomnia, “nervousness,” constipation, more or less constant pain in the region of the left ovary, while dysmenorrhea was pronounced. Objectively, we had well marked neurasthenia with acid excess, the local pain

and dysmenorrhea being due to slight displacement and pressure upon the ovary, but the lower segment of the uterus had taken on a hardening process—probably as a consequence of derangement of function incident to displacement. There was no organic trouble, the patient was well nourished, and appeared to be in perfect health.

With the assistance of a sympathetic and efficient nurse, treatment was begun immediately following the menstrual period—internally, in accordance with the plan previously outlined. Locally, mechanic stimulus (dilatation), together with support (tampons), and position, not omitting antiseptic douches, and as a result, the next period was absolutely painless—it appeared unawares.

Leucorrhea.—In view of the wide range taken in this discussion, it seems scarcely worth while to offer any suggestions relative to *leucorrhea*, its cause or cure, for the reason that it is but one link in the chain. A note should be added, however, that nature provides a measure of immunity against leucorrhea—in the form of a vaginal bacterial flora mutually antagonistic.

Prostatorrhea.—A catarrhal condition of the prostate gland, chronic enlargement occurring in elderly men as a result of magnesium infiltration with lymph-stasis, is a malady which should not be overlooked in this connection. As a matter of fact, this particular disorder is rapidly increasing, and such cases naturally fall into the hands of the surgeon, simply because the physician does not understand the pathology—and for that matter, neither does the surgeon, since the demand for surgical interference is rare. A case of chronic *prostatorrhea*, which came under observation nearly ten years ago, will serve as an illustration.

The patient, a man 62 years of age, a farmer in poor circumstances, had been confined to bed for three weeks or more from a severe attack of influenza (*la grippe*). He had a physician in daily attendance, but as he made no progress and the family were exhausted in attending upon him, his son made an appointment for a consultation Sunday morning. Arriving a little

before the doctor's expected call, and being acquainted with the family, I took the liberty of making an examination, taking the temperature, pulse-rate and respiration, all of which was explained to the medical attendant on his arrival, and excused, owing to the limited time between trains.

In order to lessen friction, I merely suggested certain changes in the treatment. For example, I did not think favorably of giving quinine, iron and strychnine when the tongue was badly coated and the bowels constipated. Moreover, I expressed my disapproval of a pint of whiskey daily, and this was the last straw. The doctor arose in a huff, and marched off uncereemoniously, saying that he would discontinue his visits, and I might take the patient. Unfortunately, this placed me in a serious predicament, because I had no license to practice in the State. However, I prescribed for the patient, the principal medication being the alkaline-saline treatment to counteract the excessive acidity, together with calcium sulphide, to stimulate the lymph-glandular apparatus. As a result of this treatment, the patient sat up in bed Tuesday morning, and had a substantial breakfast, and at the end of the week, he was able to be up and dressed so that recovery was uneventful.

The object in presenting this case is to develop the advantages of treatment in the case of prostatorrhœa, a disorder from which the patient suffered as a result of army exposure, which his medical attendant had failed to benefit during the previous ten years—it all disappeared following the treatment just outlined, and I first learned of its presence a year or so later.

Intestinal Adhesions.—Following abdominal operations, there is always more or less *plastic inflammation* involving the serous membranes which cover or invest the abdominal viscera (organs). It is a rare occurrence for any operation to be performed without more or less distension with arrest of the intestinal secretions, requiring enemata to secure bowel movements, or in case these are not practical, the usual plan is to administer Epsom salts. In addition to this complication, it is not unusual to have a sympathetic involvement of the kidneys with anuria, arresting the

functional activity, in which case the dangers from uremic poison are imminent. This is especially true in the case of operations where there is either kidney disorder or diabetes; hence, the importance of this inquiry.

Plastic inflammation differs but slightly from catarrhal inflammation—there is a modified serum along with leucocytes, and at times erythrocytes, which escape from the vessels, and this exudate, containing as it does the mother fibrin ferment which acts upon the fibrinogen, thereby producing fibrin, and this it is which causes adhesions between contiguous structures. Under favorable conditions, as previously stated, this plastic exudate may break down and be absorbed, when the adhesions disappear, but in case it does not break down, it will give rise to new tissue, fibro-connective tissue, and thus more or less permanent adhesions may result.

However, it is not unusual to have peritonitis without an abdominal operation, and this likewise may give rise to intestinal adhesions of the character just described. Again, it is possible to have a localized plastic inflammation either following abdominal operation, or as a result of undeveloped general peritonitis. We will suppose, for instance, that there is uterine displacement, pressure upon the ovary, and as a result of plastic inflammation adhesions are formed involving the appendix; or let us say, the structures which cover the uterus and lower bowel.

Should fibro-connective tissue develop, it would be necessary to have a secondary operation, but as previously pointed out, these intestinal adhesions being due to acid excess complicated by magnesium infiltration, they can be avoided, because we know that this fibro-connective tissue will not develop under normal conditions. Under ordinary circumstances, when the proper and necessary precautions have been taken to secure alkalescence of the body fluids and tissues, the operation may be done without fear of intestinal adhesions, whatever plastic inflammation may arise being absorbed by the lymph-glandular apparatus, when its integrity is maintained.

This is well illustrated in the case of a nurse, neurasthenic in a marked degree, who had just recovered from an operation for appendicitis, and was waiting a reasonable time to recuperate so that she could have another operation done for removal of the adhesions existing between the uterus and the lower bowel, this contretemps having developed as a result of the operation. At the earnest solicitation of her mother and relatives, I was over-persuaded to advise treatment, which consisted in alkaline-saline medication together with calcium sulphide, and two weeks later, when the surgeon said she was in a suitable physical condition to bear the second operation, he found by examination that the symptoms had all disappeared.

Another case, similar in character, was that of a married lady, about 35 years of age, who had submitted to local treatment for a year or more, and finally her medical attendant told her that the retroversion of the uterus was so pronounced, and the adhesions so firm that it would be impossible to afford relief without an operation. In this case precisely the same treatment was adopted, and in addition, the patient was advised to adopt a system of exercise which would tend to correct the displacement, and thus aid the medical treatment, and as a result, all symptoms disappeared, and there was no demand for an operation.

INFECTIOUS DISEASES.

It is now well known that infectious diseases are due to the presence of bacteria and their toxins, but it has escaped the attention of physicians that infectious disease is always attended with surplus acidity, due to defective oxidation—the body cells being unable to functionate. As a result of this chemic deviation, a complication supervenes—there are certain definite and demonstrable chemic changes taking place in the inorganic constituents of the tissues, which interfere with the functional activity of the cellular structures, including nerve cells.

Taking typhoid fever as an illustration, a disease due to a

pathogenic microörganism, the bacillus typhosus, and we can study to advantage the nature of bacterial invasion.

Bacteria.—Intestinal bacteria are conveniently divided into three groups or divisions, namely, fermentative, chromogenic and pathogenic. Those which give rise to fermentation do not disturb the normal cellular structures, unless putrefaction becomes excessive, since they all form peptones, dextrose and fatty acids, besides breaking up poisonous principles, such as choline, into simpler bodies. Chromogenic or color-producing bacteria are merely incidental and have nothing to do with disease, while pathogenic bacteria are the real, actual producers of disease.

Ptomains and Leucomains.—Similar in respect to their poisonous action upon the living tissues should be mentioned leucomains, alkaloidal or nitrogenous basic substances formed within the living tissues as a result of normal metabolism—as distinguished from ptomains, septic or toxic alkaloidal substances formed in dead bodies, from decomposition and disintegration of albuminous material.

Ptomains are “transition products in the process of putrefaction,” (putrefactive alkaloids), each ptomain is produced by a different microörganism, but the activity of bacteria depends upon the media in which they grow. Thus, a person may suffer at times from ptomain poisoning after eating fish, oysters, eggs, milk, cheese, ice-cream, sausage, canned meats, etc., while at other times, no untoward symptoms arise. And besides, all ptomains are not poisonous, and further, under favorable conditions, a degree of “tolerance” may be established, as in the case of persons who develop a penchant for “high” game—an illustration of an interesting phase in the artificial production of immunity, by the introduction into the body of living or dead bacteria or their products. Indeed, it has been suggested that the pathogenic action of bacteria may be directly associated with their production of ptomains, and as previously pointed out, these bacteria thrive best in a media containing magnesia in excess, the actual condition in sickness or debility from any cause; hence, medication is clearly indicated to correct

or overcome this deviation, second in importance only to the employment of appropriate remedies to neutralize the poison.

The functions of bacteria include all the properties characteristic of life, namely, nutrition, excretion, reproduction, motility and response to stimuli, and as products we have ferments, toxins, phosphorescence, pigments and acids or alkalies.

Microbic digestion, also a factor in typhoid fever, is an important function taking place in the lower part of the small intestine and also in the large intestine, resulting in the formation of numerous putrefactive products, such as carbon dioxide, hydrogen, hydrogen sulphide, indol, skatol, phenol, methane, leucin, tyrosin, butyric acid, valerianic acid, trymethyamine, etc., so that the absorption of poisons through the medium of the lacteals is more or less constant. With a "sluggish" condition of the lymph-glandular apparatus, therefore, we can account for the persistence of the disease, and also for the tendency to suppuration, all of which could be mitigated and the period materially shortened by adopting the principles here set forth—and that too, without regard to the pathogenic microörganism in respect to antidotal medication.

This suggestion naturally brings forward various questions relating to the employment of antitoxins and symbiosis, but that subject is foreign to the purpose of this work. Sufficient evidence has been offered, it is believed, to show beyond question that diminished alkalescence of the body fluids and tissues is the dominating factor in infectious disease, often leading to suppuration, and that as a result of this chemic deviation, we have magnesium infiltration as the complication. The analogy of bacterial invasion in typhoid fever can be shown in pneumonia, influenza, diphtheria, scarlet fever and smallpox, but it would be a work of supererogation, merely a repetition of the demonstration of Locke's proposition that the three angles of a triangle are equal to two right angles.

THE COMPLICATION IN CONSTITUTIONAL MALADIES—CONCLUDED.

JAUNDICE—(Clinical Reports).

SKIN DISEASES—Alternation of Diseases—Clinical Reports on Eczema and Psoriasis—Conclusion.

TONSILLITIS—Acid Excess—Anodynes—Hypnotics—Antiseptics—Antipyretics—Sudorifics—Arterial Sedatives—Topical Applications—Schema of Treatment (Tabulation)—Direct—Susceptibility—Collateral: Fever, Congestion and Restlessness—Pain, Headache or Nausea and Vomiting—Local Antiseptics—Suppuration—General and Hygienic Treatment.

APPRECIATING the difficulties attending the presentation of complete proofs in a mere sketch, a final chapter on the "*Complication*" is added. Nowadays, a proposition and demonstration are not sufficient, even following the dictum of Aristotle, to make "fact the basis of theory," although confirmed in the words of Virgil—"All of these things I saw, and part of them I was." The evidence brought forward to establish an innovation must be cumulative and harmonious, psychic as well as physiologic and chemic. There is a legend which makes Hegel say, "One man has understood me, and even he has not," thus presenting an analogy between himself and Pestalozzi, who had to write one book after another, each in an effort to explain or elucidate the teachings of the one preceding. And while Pestalozzi's methods were rather primitive and utterly lacking in systematic adjustment, they contained the seed or germ which, when cultivated, has proven a boon to modern civilization—and future generations. One of his biographers (Holman), says of the original work (*Leonard and Gertrude, A Book for the People*, 1781):

"The book has many passages of great eloquence, exquisite pathos, manly moralizing, sparkling wit, dramatic intensity, riotous humor, fine character sketches, and charming incidents, in spite of its want of plot and great diffuseness."

As intimated, the disorders discussed, have been selected with a view to securing symmetry and completeness in demonstrating the proposition that acid excess arising from intestinal indigestion and faulty assimilation is responsible for the complication designated magnesium infiltration. And the contention is that the results of treatment confirm the theory or working hypothesis. In the case of jaundice, for example, we are liable to have various forms of skin disease; when skin disease is the dominant malady, however, we are not likely to have either jaundice or tonsillitis, because the skin takes on a vicarious function in the line of excretion—incident to the acid excess. On the other hand, tonsillitis and rheumatism, being due to substantially the same cause, usually go together or make their appearance in alternation, but when the acid “habit” is corrected, both disappear—the law of compensation? The subject of tonsillitis is considered more fully than the others, not only because of its prevalence, but more especially for the reason that it supplies an apt and forcible illustration of these teachings.

JAUNDICE.

Like many other disorders, jaundice may be considered a local affection, that is, confined to the liver and due to some occult derangement of function which favors or permits the re-absorption of bile. When regarded as a nervous affection, we can point to magnesium infiltration involving the nerve mechanism—which interferes with the normal functional activity of the cells comprising its structure. Again, when we observe the marked constitutional effects attending jaundice, we incline to believe that it must be a constitutional malady—and this is true when we understand *how* it is merely a local manifestation of constitutional derangement. *Why* it is so, will not be discussed, the following clinical reports being offered to show the manner of its occurrence:

I was asked to see a lady, 62 years of age, who had suffered for several months from recurrent attacks of jaundice. I was not expected to prescribe, nor was I asked in consultation, and the husband merely wanted my professional advice as to the feasibility and necessity for an operation for removal of the gall-bladder.

An examination of the liver and gall-bladder together with the abdominal viscera disclosed no evidence of gall-stones, but marked dilatation of the stomach with involvement of the common duct (*ductus communis choledicus*), and of course, I was compelled to reject an operation, telling the patient that a successful operation would demand removal of the stomach.

For treatment, I recommended the oxgall combination and a strictly dry diet, the alkaline-saline treatment along with calcium iodide being employed later, and as a matter of fact, the patient never had another attack of jaundice, and I taught her besides, how to avoid attacks of nausea, as follows: At my first visit, the patient was lying on the left side, and unable to raise her head because of the nausea and dizziness which followed. I prescribed a small dose of copper arsenite followed by a large quantity of hot water, and advised the patient to lie on the right side, and as a result of this treatment, she was up and dressed and on the street within half an hour. She afterwards told me that she was very suspicious of the tablets and skeptical about the advantage of lying on the right side, thinking that I had administered morphine in some form, as was the custom of her regular attendant, and she was surprised but no less pleased to think that she didn't have to spend the remainder of the day in bed.

A letter from a clergyman, 58 years of age, gives a very complete history and description of jaundice as follows:

"About 14 years ago I had an acute attack of stomach trouble intercepting the normal function of the liver. It puzzled our local physicians for a correct diagnosis of the case, but after a four years' treatment as prescribed by my physician, frequent use of the stomach tube, strict diet, and judicious

exercise, I recovered, and for the past ten years considered myself a well man.

"During the winter months of 1910, I was troubled with repeated colds, which caused recurrent attacks of stomach trouble accompanied by jaundice. In the beginning of April, I had rather a severe attack of this kind, and at present I am confined to my bed with a similar attack, but with a greater severity and stubbornness to yield to medical treatment. The complexion of my entire body, as well as my urine is as yellow as gold, which might lead the uncivilized to suspect to find in the human body a mine of gold.

"My local physician is a very fair-minded man, and aims to do justice to his patients. He desired that I should be thoroughly examined by a physician who makes a special study of disorders of the stomach and liver.

"Since I am personally acquainted with you, I would like you to make arrangements at your earliest convenience for a consultation. My local physician will be present, and he can explain my condition together with the line of treatment followed a great deal better than I can."

In reply to the above communication, I wrote briefly putting the information in such shape that he could show the letter to his medical attendant, and indicated a convenient time for the proposed consultation. Perhaps it will be interesting to the reader if at least a portion of this communication is reproduced, as follows:

"After reading your letter, I am under the impression that you are suffering from recurrent attacks of jaundice, but of course, there is a possibility that you may have gall-stones as a complication. In the matter of treatment, I should first make an effort to correct the jaundice, and this will measurably clear up the question relating to gall-stones; at least, it will enable us to determine with greater certainty, whether or not gall-stones are present.

"I am sending you the necessary medicines for this purpose. You should take a light diet, two of the tablets (5 grains succin-

ate of soda), immediately before meals, and one teaspoonful of the alkaline-saline in about a half goblet of water at room temperature every two hours, beginning at least one hour before breakfast. This treatment should show decided results at the end of three days."

However, the consultation did not take place, as a letter from the patient's daughter, dated a few days later, countermanded the request. She says:

"On Sunday my father was taken very sick and he is now under treatment. He was examined by two hospital surgeons and three physicians. They have him under treatment, and he is attended by a nurse, doing as well as can be expected. As soon as he has sufficiently recovered he will come and see you personally."

Continuing the record, a communication dated at a sea-side resort, was as follows:

"I have been very sick, but escaped death, although I am not as yet out of danger.

"About ten days ago I came to this place. I expect to get to Philadelphia next Friday evening and on Saturday I will call on you to diagnose my case.

"I desire a thorough examination—nothing is to be left undone, and if you think I ought to go to a hospital, I will do so, although I will not be able to pay much. I would submit the following in regard to my ailments to aid you in making the diagnosis:

"About eight weeks ago I was suddenly taken sick. I became as yellow as an orange. My local physicians became alarmed, and differed as to the cause of jaundice. Two surgeons were called in; one diagnosed the case as gall-stones; the other as an obstruction of the gall-duct caused by viscid bile. It seems that the latter was correct, because the ducts were opened by hot packs and medicine.

"Under the care of a trained nurse, I improved so far that at present I am able to be about, but the following is my present condition:

(1) "*Liver* very sluggish and torpid; stool, light color, and at times a pain around the liver; often pain in back and shoulders, still a little jaundice on body.

(2) "*Stomach* very sensitive and rebellious—stomach was very bad before the jaundice appeared. I often have cramps and colic; these become so severe and are so persistent that nothing but morphine hypodermics afford relief. While here, I had a few stomach attacks and called on an old doctor for relief, and he gave me a mixture of his own for stomach trouble. The doctor said, 'You stay right here and take the medicine, and we will watch what it will do for you.' After half an hour, the medicine gave me severe pain—there was a severe struggle—after that the pain subsided and I got relief.

(3) "*Bowels*: Three or four weeks ago they were very sluggish, constipated, etc., and the nurse had trouble to keep them open. Now, my bowels are almost too loose; they move three or four times a day, and stool is not formed, very watery. Sometimes I think that a growth is somewhere interfering with the function of my liver. My kidneys seem to be all right."

As a result of the examination which took place, I found some dilatation of the stomach, passive congestion of the liver, with engorgement of the bile-ducts, more or less pain, or a sense of dulness being found in the liver region. There was no pain referred to the back, but the skin was considerably discolored, while the salivary secretion was distinctly acid. It turned blue litmus paper pink. Placing a strip of wet litmus paper between the thumb and finger, the acid reaction was pronounced—it was scarlet in color.

Without a desire to boast, it is a singular fact that I prescribed at this visit, the identical treatment recommended by mail seven weeks previously, succinate of soda, the alkaline-saline—and to relieve the attacks of pain, copper arsenite, $\frac{1}{100}$ grain was added.

As a result of the above treatment, the attacks of colic disappeared; in fact, he never had a single attack after beginning treatment. At the second visit, ten days later, while waiting in the office, he made up the following memorandum:

(1) "*Stomach and Bowels*: Improved—have no cramps—appetite good—stools, two and three times a day, irregular—color, irregular; coated lips and mouth—no gain in weight—the illness had reduced the weight over 40 pounds).

(2) "*Liver*: Dull pains, especially near the back—this requires attention. When I reach up or bend over, I have pain.

(3) "*Kidneys*: Pain across the back—must labor to start a discharge of urine—often eight or nine times in twenty-four hours. Urine often colorless. Legs, languid and painful—unpleasant feeling in the feet—a sudden stitch of pain, often two or three times a day in my head."

For all practical purposes, the symptoms may be regarded merely as evidences of the debility following a severe attack of jaundice, and as a matter of course, we must depend upon nutrition—there are no medicinal remedies which will produce miraculous effects. The alkaline-saline treatment was discontinued, and the patient had instead the heparin tablet together with the copper arsenite as before, and as a result, a report was received under date of September 1, as follows:

"My medicine is about all gone. My appetite is good. I have gained eleven pounds in weight, but the pain in my liver near the back is becoming more distinct. I especially called your attention to this at the last visit."

Following this report, the patient was advised to resume the succinate of soda together with the alkaline-saline, and apparently everything went along swimmingly, as no further reports were received until his office visit, six weeks later. At this time, the saliva was again distinctly acid, the reaction of the skin scarlet red and knee-jerk absent; the pulse-rate was 60 beats per minute and normal; the patient complained of almost constant frontal headache; he also walked lame, owing to involvement of the sciatic nerve.

This patient was in a fairly good physical condition, still gaining in weight—good appetite—regular bowel movements, with no jaundice, although he complained of insomnia. He

was not able to sleep more than a couple of hours at a time, and consequently, he felt the need of rest.

Before making a record of the treatment instituted at this visit, it will be advisable to recall some of the most prominent—and most important—factors in this case.

This is a typical case of jaundice, the climax being reached on June 12, when two surgeons and three physicians were in consultation. One of the surgeons, a man with a State-wide reputation, insisted upon immediate operation, saying that the patient could not live more than twenty-four hours without it. The patient first comes under observation seven weeks later, still jaundiced and with symptoms of acute congestion of the liver and persistent, colicky pains in the stomach. He is greatly reduced in flesh and strength, being unable to take food, and begins to fear the presence of a malignant growth.

Mentally, his condition is normal, shown by his willingness to enter a hospital, but when he finds that relief is so readily secured, he evidently concludes that he is out of danger and nature will do the rest. Two office visits in twelve weeks scarcely affords a physician much opportunity of saving the life of a dying man. As a matter of fact, this patient, like many others, has neglected and disregarded treatment, believing himself independent of his medical attendant. It is a safe estimate that he would have been as far advanced toward recovery as he was at this last visit, had the treatment originally advised, been faithfully carried out. Then, we would have had to deal with substantially the same conditions, really, the remote effects of the constitutional disorder, the jaundice, liver congestion and gastric derangement, being taken collectively as the immediate effects.

Treatment, therefore, to be successful and insure permanency, must be conducted for the purpose of correcting the original deviation from normal, the acid excess being taken, not only as a guide for medication, but also as a proof of the physico-chemic changes leading up to the original attack. The nerve structures have become obtunded through factitious,

inorganic deposits of magnesium, either by (1) simple replacement, (2) chemic transformation, or (3) united with calcium.

In order to restore function, it is imperative that we promote magnesium dissociation—according to the law of mass action, or by chemic disintegration. Our efforts in this direction, however, would be fruitless without attention to the persistent and pronounced acid excess. Fortunately, the digestion is unimpaired; hence, the third factor in treatment may safely be omitted. Medication was therefore limited to the alkaline-saline treatment for the acid excess, and the calcium iodide, also an alkali, to promote magnesium dissociation, by chemic disintegration.

During the ensuing year, I prescribed for this patient several times by mail, for the usual symptoms characteristic of magnesium infiltration, such as habitual constipation, indigestion, and there was always more or less complaint of headache, due, of course, to the sluggish condition of the lymph-glandular system. I saw him once, in August, when he had an ordinary attack of autumnal fever, or summer catarrh, with the usual symptoms, and as in the previous instances, it was found that calcium iodide was the most valuable remedy—conjointly with medication for the purpose of correcting the excessive acidity.

SKIN DISEASES.

There is no more important matter to consider in the treatment of skin diseases than the abnormal reactions arising from defective metabolism. Notwithstanding the most careful attention to diet, exercise and bathing, many disorders persist until the habit known as “hyperacidity” has been overcome. Still, this is not precisely true in all cases, since it can be shown that many cases of skin disorders such as eczema, are directly traceable to unsuitable dietary—and for the most part, this unsuitable diet consists in the employment of cereals, almost exclusively, for breakfast.

A case is recalled of a young lady, rather stout, who apparently enjoyed perfect health, but she would have recurrent

attacks of eczema, no part of the body escaping. With correction of the dietary and the administration of calcium carbonate (vitalized chalk), in substantial doses, the trouble would all disappear in the course of a few days or a week. This patient also reported that if she went to the country to remain only a few days, she generally returned entirely free from any skin eruption, although it might have been severe when she left home.

Alternation of Diseases.—From the earliest times there has prevailed a popular belief in the alternation of diseases, particularly diseases affecting the surface of the body, such as boils, carbuncle, eczema, etc. Thus, we may have bronchitis and asthma alternating with eczema; the local treatment of pruritus (itching), and erythroderma (redness of the skin), frequently gives rise to congestion of the lungs and albuminuria; and in the case of boils and “running” sores, there is often an affection developed for them bordering on feticism.

In such cases, the impression is that the disease “strikes in,” while as a matter of fact, it merely shows an excess of waste material trying to find an outlet—when one channel is blocked, another is sought, so that other organs or tissues are called upon to perform a vicarious function.

Now, the Vienna school—not to mention schools less distant—would have us believe that all these local manifestations arise from microbic invasion, but no reason is advanced to account for those who escape. Indeed, this view of the pathology is extremely superficial, when we take into account the chemic deviation (acid excess), responsible for imperfect oxidation and failure in elimination. With proper attention to this constitutional defect, microorganisms would not find suitable pabulum for growth and multiplication. The plan is, therefore, to alkalinize the blood—restore the normal alkalinity—when the affected tissues will resume their normal functions.

This unfortunate status in the *art medendi*, this mental strabismus, places the modern physician in a rather anoma-

lous position—not unlike that of a good marksman with the sights on his gun not properly adjusted. Although he has the range, a first-class gun and a good aim, his shots hit the target six inches above the bull's-eye. The whole difficulty can be resolved by correction or removal of the cause which leads to impairment of the secondary assimilation—when the doctor's foresight will be as good as his "hindsight".

Numerous cases of *acne*, a serious blemish to the complexion in young women, are due entirely to acid excess, and will readily respond to treatment adopted to overcome this chemic deviation, provided that we supply the nervous system with the necessary proximate principles to enable the nerve cells to functionate, lime in some form being distinctly indicated. Thus, it will be seen that non-parasitic skin diseases resemble in some respects jaundice—they may be considered as a local disorder, a nerve affection, or a constitutional disease, and as will be shown in the following reports, the evidence clearly points to skin disease of this character as a local manifestation of a constitutional diathesis.

Eczema.—A case of eczema affecting the hands and feet, with a history of seven years' duration came under observation and absolutely resisted the most approved methods until alkaline-saline medication was introduced as a part of the treatment. To give a slight idea of the extreme character of this case, it might be mentioned that the discharge was so profuse as to require a change of stockings three times a day, and the appearance of the tissues resembled raw meat. This patient made rapid improvement after modification in the treatment, and later a perfect recovery, the normal tissue change having been firmly reëstablished—at least, I presume this statement is warranted, since the patient has not returned after a lapse of nearly three years.

The following record of a case of recurrent eczema is particularly valuable as a means of confirming the teachings put forward regarding the different factors responsible for

the disease—in eczema, we have the acid excess, the sluggish condition of the lymph-glandular apparatus, and also the magnesium infiltration as the constant complication, especially in elderly patients.

About a year preceding the present writing, I prescribed by mail for a gentleman 81 years of age, who was then suffering from a persistent attack of eczema, which had resisted treatment for several months. My expectation was that the patient would report promptly; in fact, I requested that he would report after treatment had been continued for one full week, but I had no report until four months later. The following extracts from a letter received at this time will give a fairly complete description of the serious nature of the attack:

“I believe my disease to be constitutional, an inheritance, and hence, innate, because my earliest recollections are associated with it, but it has assumed different forms at other periods.

“Some thirty-five or forty years ago, I had an accomplished French gentleman as tutor for my children, who observed my trouble and disability and advised me to get”—mentioning a popular tar solution—“who said the disease was in my blood, and that this would take it out. I had it imported and took several bottles, a teaspoonful three times a day in a glass of water. In a month, I was in Job’s condition, but soon got over the boils, and from that day until last fall I was not troubled with eczema. I want to try it again.

“I do not recall whether I mentioned in my former letter that I have suffered six months from chronic diarrhea, so bad that at times I had to wear napkins. I think it was due to intestinal indigestion; my stomach being in good condition, I didn’t suffer very much pain, unless aggravated. I was more or less debilitated, so I commenced experimenting with your treatment (alkaline-saline and calcium iodide).”

The patient then goes on to describe the difficulty with the bowels, and the involvement or irritation of the bladder which attended the treatment, adding: “Following your prescription, my symptoms were aggravated with no apparent effect

on the eczema. In fact, the green-soap liniment aggravated the eczema, irritating the raw places, and gave considerable pain. Nevertheless, I continued experimenting with the treatment, believing that it was the right thing if properly used, and I finally discovered that one teaspoonful of the effervescent powder at bed-time preceded one hour by the calcium iodide with half the quantity in the morning before breakfast had a happy effect. I then added a noon-day dose, and now take one in the afternoon.

"The result has been that my bowels are in normal condition, my urine though high-colored and reduced in quantity is not acrid, *i. e.*, the irritating sensation about the bladder and urethra has disappeared. But I do not discover any effect upon the eczema, which has made slow progress, and holds its ground. By the use of palliatives, such as bathing with a solution of Epsom salt, and then anointing with various ointments, I manage to get cat-naps and keep fairly comfortable.

"My apprehension is that I am minus the *vix medicatrix naturæ*, and that this inherent weakness will continue to hold the fort. Nevertheless, if you concur, I would like to try once more the tar solution."

It would be a mistake to assume that the treatment was unsuccessful, because the eczema was not benefited. The reader will bear in mind that this report was sent four months after treatment was advised instead of one week. The object of the preliminary treatment was to neutralize the acid excess, and promote magnesium dissociation, and thus restore the normal functional activity of the cells, including, of course, the trophic nerve cells, which govern nutrition.

As previously pointed out, in the treatment of eczema it is necessary to stimulate the lymph-glandular apparatus, and since there was no serious objection to the tar solution, of course, that was sent. Two weeks later a reply was received, and extracts from the same will show the prompt and satisfactory effects of treatment:

"I am happy to report that my sores are all healed, the irritation is lessened, and I am strengthened so that I expect to put on my clothes tomorrow, which I have not done for four weeks. The eruption has all gone in, but about my neck and chest and limbs there is more or less discoloration and itching, especially at night in bed. I find that boric acid in the form of solution is about the most soothing application. Have lost some fifteen to twenty pounds in flesh, but have a good appetite, and hope to be able to gain in strength and flesh.

"I took the medicine as directed, alkaline-saline and tar solution in alternation for a week, and along with this, calcium sulphide (grain $\frac{1}{8}$), five times daily. I shall now resume the tar solution, one teaspoonful three times a day before meals, which I believe will eradicate the uric acid from my blood."

In concluding this report, it is only necessary to point to the peculiar notions of the patient, that his malady was inherent, that it was due to uric acid, and that the eczema could be relieved by the internal use of tar. These false premises were later completely demonstrated, as I recently received a communication from the patient, saying that notwithstanding the persistent use of the tar solution, the eczema has again developed, showing the tendency to recur, and this is doubtless due to dietetic errors.

Eczema capitis (eczema of the scalp) is a variety confined to the head, usually seen in children. It is diffuse, pustular, and impetiginous (pea- or finger-nail sized), and with the usual treatment employed at the present day, a very intractable disorder, often requiring months of treatment, notwithstanding the employment of both external and internal remedies. However, our present knowledge regarding acid excess, impairment of the lymph-glandular apparatus with magnesium infiltration as the complication, a few days, or at most, a week, is quite sufficient to effect a complete cure. In these cases we have a distinct advantage over treatment of disease in elderly persons, the active tissue change which is going on in the body—hence, as a rule, it is only necessary to administer lime

in sufficient quantity to overcome what I have termed "simple replacement," this being accomplished according to the law of mass action. The following record will suffice to show the efficiency and simplicity of treatment.

A child, twenty months old, apparently in perfect health, was afflicted with eczema capitis, a typical case, which had been in evidence for several weeks, and notwithstanding active local and internal treatment, the disorder seemed to be making progress. Treatment in this case consisted in the employment of calcium carbonate (vitalized chalk), in the form of a normal trituration, five grains of the trituration being given four times daily, no local treatment being advised except cleanliness. In view of the serious character of the disorder, however, I requested the father to report after treatment had been continued for a period of four days, and this report was substantially what the editors say of war-like conflicts—"short, sharp and decisive." The letter said, "the child was almost well," and recovery was complete within ten days.

Psoriasis.—The intrinsic merits of these teachings can scarcely be appreciated, because the results attending treatment are so incredible. Perhaps, it will strengthen the claims advanced if another type of skin disease is considered, psoriasis, one of the most intractable of all.

The patient, a man, 36 years of age, gives a history of ten years' suffering from psoriasis, the diagnosis having been confirmed by a number of experts who have had him under treatment for various periods of time, and at the first visit, he presented a typical case. The body as well as the limbs were covered with the eruption, and in addition to this, there was considerable pigmentation, especially on the legs, where healing had taken place from time to time. During the entire ten years, there had only been an abatement for a short interval, and neither he nor his medical attendant could determine what favorable influence was responsible for it.

The personal history is entirely favorable, and the only objectionable feature in the family history refers to the death

of his father and mother from tuberculosis. The father had reached 50 years of age or more, always enjoyed perfect health, but he jumped into a mill-race during the winter, to rescue a boy who had fallen into the water, and from that time forward he suffered from cough, and died from tubercular infection. Unfortunately, in those days, the dangers from tubercular infection were not as well understood as at the present time, and as a consequence, the mother nursed the father during his illness, and became infected—she died five weeks later.

As the probable causative factor in the production of psoriasis in this case, it should be mentioned that for several years previous to its development, the patient had suffered from persistent dyspepsia, and of course, we know what that means, hyperacidity, only another name for acid excess. The patient reports that the dyspepsia disappeared entirely and that too, quite suddenly after he had eaten freely of ripe peaches. Asking how many peaches he ate, he said probably fifty or seventy-five peaches in one day. It was not long after that until the psoriasis appeared.

This patient is an intelligent man, engaged in mercantile business, and of course has become somewhat conversant with the views of half a dozen or more specialists who have treated him—none of them for less than a year at a time. In discussing the preliminary treatment, of course, it was explained to him that the acid excess arising from the continued indigestion had so affected the trophic nerves as to produce this peculiar skin disease, and I proposed that he should take a hot bath, an ordinary tub-bath, adding half a pound of Epsom salt to each bath. This was to be continued for a week or ten days, the hot bath to be taken every second or third night. As a result of this treatment, the patient was thoroughly convinced, because the Epsom salt solution nearly drove him wild. Even before this was begun he would frequently have to get up as often as five or six times at night, using an ointment to allay the intense itching.

Preliminary treatment was begun by the employment of moderately small doses of calcium carbonate, and later, larger doses were given, when it was found that the treatment showed

improvement, not only relief from the itching, but the production of scales was diminished, and new "spots" less frequent. Further, it was necessary to observe the effect of the vitalized chalk upon the bowel movements—it is possible to produce calcareous deposits as a result of the magnesium dissociation, because the surplus lime will combine with it in the intestine, and for all practical purposes, it forms concrete. It might be added that the ingestion of fruits containing seeds, such as raspberries, blackberries, grapes, and tomatoes will "gather" the calcareous material, and may even produce obstruction.

However, we had no difficulty in the matter of magnesium dissociation, and as a consequence, large doses were administered, as high as thirty grains of a normal trituration three times a day, but the results were entirely satisfactory, the body and limbs being free from the eruption at the expiration of three months. Of course, there was pigmentation, and later, a disposition to recurrence, but the patient has been under observation now for over two years, and for all that period he has never had any at one time more than half-dozen "spots."

Of course, in addition to the calcium carbonate, the patient had from time to time, the alkaline-saline treatment, but this acid tendency has long ago disappeared, so that it is not now a factor in the treatment.

Conclusion.—A time was, and it is not far distant, when it was considered the *sine qua non* to establish the diagnosis, by naming the disease; inasmuch as that method proved unsatisfactory, an effort was made to establish a new regime, the idea being advanced that it was far better to treat the patient and let the disease take care of itself. Unfortunately, this latter plan has acted as a boomerang, patients under treatment for months and years being awakened from their lethargy by a realization of the true state of affairs—they were treated socially rather than professionally. As will be observed in the present work, the aim has been to establish principles, in order that the conditions responsible for the disease might be corrected, mitigated or removed, and a sufficient number of illustrations have been added here and

there to confirm the teachings put forward. The information or knowledge thus advanced, it is believed, will enact the rôle of rudder and compass to guide physicians safely over the uncharted sea of therapeutics.

Now, in respect to the disorders considered in the present section, the reader must understand that it is necessary to comprehend the causative factors; that in order to effect cures, we must determine with certainty these factors, and if there is more than one, we must make allowance therefor. In other words, it is not a correct idea to take the diagnosis, and depend upon a single remedy or combination of remedies, because these factors are different, notwithstanding the fact that they are interdependent and inter-related.

Thus, we cannot with certainty or safety overlook certain fundamental principles which are recognized as interfering with nutrition, and so long as these remain uncorrected, the disease by whatever name, is certain to persist. Therefore, the physician must be competent to recognize these factors, no matter in what form they appear, or from what position they are viewed; and besides, he must be able to entertain more than a single syllogism; in fact, he must be able to recognize the truth of the proposition that the three angles of a triangle are equal to two right angles. The foregoing axiomatic deduction being advanced to a fellow practitioner, he innocently asked, "What is a *right* angle?" As a writer on the *Romances of Chivalry* says of the Knights—"brave, generous, self-sacrificing and devout, but the indispensable virtue of chastity is absent from their lives," so may we say of some modern doctors: they are brave, generous, self-sacrificing and devout, but knowledge, the essential requisite, is woefully lacking.

TONSILLITIS.

In connection with this study of suppuration and its relation to magnesium infiltration, it seems worth while to discuss more fully the subject of tonsillitis.

Tonsillitis in children, as in adults, is a coccus infection, usually streptococcus, but its contagious character is greatly over-rated—although this does not mean that it is not catching, nor that there is no serious danger to the patient as a result of coccus infection. On the contrary, an attack of tonsillitis demands careful attention to the chemic status of the patient on the part of the medical attendant, to prevent dissemination of the infection through the medium of the lymphatics—to the kidneys, the lungs, the pluræ and the brain. A diminished alkalinity of the body fluids, blood and lymph—acid excess—with the coincident impairment of the lymph-glandular apparatus may be sufficient to develop an endocarditis, a pericarditis, or even appendicitis; hence, the paramount importance of treatment conducted for the purpose of neutralizing acidity—to make the cells work.

Like many other contagious (*contactuous*) diseases, tonsillitis will not occur unless the conditions are favorable for the growth and multiplication of the infection. When these conditions are understood, and the proper measures taken for their correction, treatment of the disease is extremely simple. A study of the usual deviations from normal will suffice to make this point clear and distinct.

In a general way, every case of tonsillitis is traceable to disordered digestion, exposure to cold being the exciting factor. In the incipency of an attack, therefore, the proper thing to do is to adopt a restricted dietary and try to avoid exposure—in short, to fast and keep warm and comfortable, when the normal nerve stimuli, electric, thermic, mechanic and chemic, will neutralize the toxin (infection). Let this toxin gain entrance to the circulation and there follows reaction or fever—thermic stimulus being called into play. Thermic stimulus generates electricity and electric stimulus develops chemic changes (reactions or stimuli), and if the child is old enough, we also have a psychic effect or stimulus. The severity of an attack, however, is determined by the chemic status of the body fluids and tissues; in other words, by studying the reactions.

Acid Excess.—An acid salivary reaction is the token—the sign of susceptibility—and its persistence necessarily hinders recovery and prolongs convalescence, because acid saliva is abnormal, positive evidence that there is a disordered condition of the nervous mechanism incident to the indigestion. This is well illustrated in severe cases, where we have to contend with high temperature, restlessness, even delirium, sleeplessness, and more or less pain in consequence of the congestion. At first a local manifestation, the vascular character of the tonsil acts as a port of entrance—through the lymphatics which invest the tonsil, enabling it to functionate. Under normal conditions as to reactions, however, the antiseptic properties of the body fluids would be quite sufficient to neutralize infection as fast as taken up—showing that acid excess with coincident reduction in alkalinity of the blood must be regarded as responsible for systemic invasion.

This is not all; nor does the foregoing description afford a normal perspective of the disease, except in a most superficial manner—like all perspectives. Indigestion, while it leads to acid excess and susceptibility to coccus infection, does even more, through the chemic reactions taking place in the nerve structures, the missing link in respect to treatment. Here, as in every other instance or disorder, acute and chronic, the acidity depletes the lime content while magnesium takes its place, so that the nerve cells cease to functionate in a normal manner, and thus the tissues lose their resistant properties—an illustration of the chemic changes taking place which give rise to or determine susceptibility.

Summing up the various deviations from normal, disordered digestion leading to acid excess, with exposure to cold, generally the exciting factor, coccus infection through the tonsil with the coincident chemic transformation in the nerve structures, and the problem of treatment is more than half solved—at least, it is simplified in a marked degree, as will be seen from a cursory glance at modern methods, scientific and traditional.

Anodynes—opium and its derivatives—are employed to relieve pain, but they do more harm by further obtunding nerve susceptibility, arresting the secretions, while the infection runs riot through the system—and the patient is then convinced of his illness. What effects, immediate and remote, are produced upon the delicate brain structures of infants and children by this scientific (?) misfit must be discovered by the psychologist of the future—it passeth understanding.

Hypnotics are used to promote sleep, oblivious to the fact that the germs work while you sleep, so that the “expectant” plan serves merely to prolong the malady and pave the way for interminable complications.

Antiseptics are of value, for their effect upon the tonsils—not for systemic effect—but to be efficacious, it is necessary to maintain antisepsis throughout the entire nasal as well as the buccal cavity. The best results are attained only through thorough disinfection of the naso-pharyngeal space, and especially the upper portion—an exceptionally favorable nidus for germ proliferation. Antiseptics for the bowels are demanded only in the case of prolonged illness as a result of employing harmful anodynes and useless hypnotics.

Antipyretics, to reduce fever, are of questionable advantage, except as a temporary expedient, because of their depressing effect upon the heart. I have employed with good results the combination of acetanilide with caffeine and nuclein—in consideration of its demonstrable efficiency in promoting the radiation of heat, together with its advantages as an analgesic and freedom from untoward after-effects. It should be understood, however, that antipyretics are not curative—they are merely expedients, and are employed as collateral treatment, for the temperature elevation, the latter being a symptom—not the disease itself.

Sudorifics, to produce free perspiration, along with sialagogues, to stimulate the flow of saliva, are of doubtful utility—on a par with the antiquated and obsolete practice of administering purgatives and emetics for their revulsive effects.

Arterial sedatives, in small doses, may be employed to advantage in the early stage of an attack to relieve active congestion, a mere symptom of the intensity of infection when coupled with the personal susceptibility. With efficient measures to correct abnormal reactions, the demand for symptomatic treatment disappears.

Topical Applications.—Coming now to the traditional methods included under the head of topical applications, such as swabbing, gargling, the employment of heat, in the form of wet or dry compresses, poultices of mush, flax-seed, hops, etc., together with ham-fat, salt-bacon, dirty stockings and “rubbing” bottles of every conceivable description and variety, it is incredible that such absurd methods should still prevail among an educated and intelligent people.

Studying the disorder from a scientific viewpoint, in the abstract, we have to deal with systemic infection, the nature of which is known. This infection finds entrance through the tonsil, giving rise to the usual symptoms produced by similar toxins. The apparent cause, disordered digestion, coupled with cold and exposure, has long been recognized, but the pre-existent effects, which produce or create the susceptibility, have been overlooked—as a result of failure to observe the status of the reactions. And here is found the pivotal factor, or turning point, which determines susceptibility. In other words, derangement of the physiologic equilibrium has so interfered with nerve conduction that the cellular structures imperfectly perform their functions. Just as in other instances of like character, typhoid fever, tuberculosis and pneumonia, we discover that the magnesium infiltration—an effect—is the real cause of the apparent cause of tonsillitis, and thus we have advanced another step in demonstrating the chemic problem in nutrition.

To give this discussion a practical turn, it will be necessary to present evidence in concrete form to confirm the abstract theory—and establish the fundamental basis upon which it rests. This task will be rendered less difficult by

submitting a preliminary chart for the purpose of developing the systematic plan of treatment which is universally applicable—although early treatment precludes the necessity for carrying it out in detail and prevents complications, recovery being usually complete within twenty-four hours, with no lingering convalescence.

TREATMENT OF TONSILLITIS (SCHEMA).

<i>Direct:</i>	{ Nuclein—Antidote to coccus infection; Alkaline-saline—To neutralize acid excess; Calcium Salts—To promote magnesium dissociation.
<i>Collateral:</i>	{ Fever—Arterial sedatives (Gelsemium); Pain—Acetanilide with caffeine; Antisepsis—Local applications; Suppuration—Evacuation (Calcium sulphide to prevent).
<i>General:</i>	{ Diet and hygiene; Inunctions, massage, baths; Electricity, oxygen enemata.

Direct Treatment.—To antidote coccus infection, we have nuclein, a glandular product, given in the form of tablet triturates, small doses at short intervals, or a single large dose hypodermically. Fever, pain, restlessness, difficulty in swallowing, all subside in the course of a few hours, while the tendency to suppuration is arrested.

As a rule, but one of the tonsils is involved at first, the other becoming affected usually within twenty-four hours—sometimes several days elapse—but this is avoided by alkaline-saline medication to neutralize acid excess, determined by testing the saliva with blue litmus paper.

Susceptibility having been brought about through the acid excess and consecutive deterioration in nerve conduction, it naturally follows that measures should be employed for the special purpose of reëstablishing a normal condition in the cellular structures, and especially is this necessary in respect to the nerve cells, in consequence of the lime depletion. By adopting this course, we avoid the “convalescent” period, although with early treatment in the case of robust children as previously outlined, there is rarely a

demand for the calcium salts. When we have to contend with debility, susceptibility to colds with evidences of failure in nutrition—so-called “delicate” children—calcium constitutes the most important part of the convalescent treatment.

There is an impression prevails—with physicians—that tonsillitis in childhood and adolescence foreshadows rheumatism in later life, and they point with pride (?) to the records of their consecutive appearance as proof, but this is an extremely superficial view and the deduction is unwarranted. Correction of the acid excess in childhood coupled with attention to the disordered digestion, and the child will out-grow the diathesis. In the case of adults also, identical management enables them to outlive it, so that in the final analysis, immunity from tonsillitis—as well as from rheumatism—relates to chemistry rather than to physiology. Hence, the utter fallacy of traditional methods, grouped under the head of “topical applications,” there being neither reason nor excuse for their multiplicity.

Collateral Treatment.—It will now be in order to discuss collateral or symptomatic treatment—rarely demanded unless the case is well advanced, or the patient a confirmed sufferer from the acid diathesis.

Fever, congestion and restlessness or delirium are promptly relieved by the internal administration of gelsemium, an arterial sedative, in small doses at short intervals. By relaxing arterial tension, a more equable distribution of the blood is secured—fever is allayed—congestion relieved and restlessness overcome, so that the most formidable symptoms subside in the course of a few hours.

Pain, headache, or nausea and vomiting readily yield to the analgesic effects of acetanilide with caffeine, a small dose being given at hourly intervals and followed by a moderate quantity of hot water—to insure immediate solution and prompt distribution through the medium of the circulation. It is also an efficient antiseptic. This combination I have used for upwards of twenty years and invariably with the most happy effects.

Local antiseptics are not without value, although not imperatively demanded in mild cases, except as a precautionary measure—and right here should be emphasized the danger of infection from kissing. All local applications should be bland and free from irritation, and with the exception of hydrogen dioxide as a throat spray, no watery solutions should be employed. By far the most important local application consists in thorough disinfection of the nasal cavity, by means of a non-irritant antiseptic held in solution by oil. Caustics and the like should find no place in the treatment of tonsillitis—unless it is desired to aggravate the malady, prolong the illness and pave the way for complications.

Suppuration demands immediate evacuation, followed by calcium sulphide—to arrest the tendency. When pus-formation is imminent, congestion is relieved by arterial sedatives conjointly with calcium sulphide—the excessive acidity being neutralized by alkaline-saline treatment—while external applications, such as poultices, insure it.

General treatment is outlined in the tabulation, diet and hygiene being of prime importance. Usually, in tonsillitis, the patient develops a craving for some particular food substance, but inability to swallow without pain becomes a constant source of irritation. Careful study of this problem shows that the “craving” arises from the highly acid condition of the system—a chemic deviation, coincident with or consecutive to depletion of the lime content of the nuclear proteid. This symptom is promptly relieved by alkaline-saline medication to neutralize acidity—later, the calcium salts should be employed to correct the chemic deviation.

On the whole, therefore, we shall more quickly arrest the disorder and avoid a lingering convalescence by fasting, or by adopting a restricted dietary, until the acute symptoms have subsided.

Hygienic treatment requires no elaborate discussion. It is desirable that the patient be isolated and his room well ventilated, the temperature being maintained at about 68° F.

DISEASES OF THE NERVOUS SYSTEM.

PSYCHIATRY—Alkalescence a Factor—Rest and Exercise—Causes and Symptoms—Physiologic Basis—Forms of Invasion—Infantile Paralysis—Paresthesia—Spinal Section—Raynaud's Disease—Motor and Sensory Nerves—Morbid Reflexes—Locomotor Ataxia—Incipient Paresis—Nervous Prostration—Abstract and Concrete Evidence—Senile Changes—Sclerosis—Prevention or Cure—Agraphia—Aphasia—Old Age.

Psychiatry.—From my viewpoint, nervous disorders follow magnesium infiltration, not with the same regularity, but with the usual certainty, as night follows day. Although the psychic presentation of treatment advanced by Dubois is ingenuous and interesting, it lacks an essential *desideratum* requisite for scientific classification—it is not logical. While not denying the complete recovery of his recorded cases as a result of dialectic animadversions, there is a frank confession from him that many patients fail to respond, even with the addition of drugs. All physicians, as a rule, even unconsciously, get a distinct advantage from dirigation, which is the foundation of mental healing, Christian science, and other methods which appeal to the subconscious ego, but it is uncertain, indefinite, superficial, and chimerical in the extreme. In my own experience I have seen patients recover from both acute and chronic ailments of long standing without having the prescription filled, or within a few days after beginning treatment and long before medication could possibly have brought about results, but these have been the exception rather than the rule. Nevertheless, it must be admitted that there is evidence sufficient to warrant a belief in psychiatry—a receptive agnosticism,

but its greatest attainment must be reached through the regular channels which characterize all scientific induction.

Alkalescence a Factor.—To consider this question briefly, let us follow the changes in our daily food. When digestion is completed—primary assimilation—certain changes take place—secondary assimilation—by which a portion is converted into living tissue, a physiologic change, and also a portion is converted into bone, a chemic change, but the protoplasmic cells are so infinitesimal that a point is reached where these distinctions are impossible, except to the psychologist. A foundation is laid, however, as regards the nervous system. Thus, Heidenhain introduced aniline into the circulation to find that nerve tissue alone took up the stain—in varying degrees in different organs depending upon the alkalescence of the tissues. Taking this in connection with the experimental researches of Loeb, going to show that alkalescence is dependent upon nerve stimuli—and bearing in mind that the transmission of nerve impulses is hindered by magnesium infiltration, we have a fairly complete answer to Dubois' theory, and at the same time a confirmation of my claims in favor of adopting measures to neutralize acid excess. Also should be mentioned here the beneficial effects of high frequency electricity in reducing arterial tension, thus corroborating the laboratory researches of Loeb, although in well marked cases of magnesium infiltration only temporary benefit can be expected from this alone.

And right here arises a question of the utmost importance, one which my critics will propound with emphasis and evident satisfaction—How it is practicable or possible to adjust alkaline-saline medication to the normal demands of the system? Fortunately, the answer is ready at hand.¹

“Moore and Roaf,² have shown the affinities of the cells other than the red blood cells, for potassium and the phosphates

¹ Jonathan Wright, M.D., *The Mechanico Biological Standpoint in Medical Problems*, New York Medical Journal, October 10, 1908.

² *Biochemical Journal*, January 22, 1908.

and the lack of it for sodium and the chlorides. This distinction they ascribe not to the cell membrane, but to the internal mechanism of the cell; that is, the currents back and forth do not obey such osmotic laws as we have been able to deduce from the action of membranes on fluids outside of the body. They find that there is a point of equilibrium not identical with that of equal saturation, beyond which these attractive forces do not act. The cell, by selective action, draws to itself a large number of potassium and a small number of sodium ions, and there is an index of saturation for each, varying somewhat in different situations and under varying conditions. We have seen the indications of the same law governing the bacterium at the surface, the same equilibrium has been pointed out for the tonsillar crypt as for the liver cell and the kidney cell, bathed in the fluids of their environments. The living colloid of the kidney cell, acting on the inert crystalline molecule of potassium, acts differently through its membrane than water through a dead membrane. The inert crystalline molecule of potassium and the dust particle have different sorts of tension from the white blood cell and the bacterium. The potential index of the surface tension, therefore, depends on the internal chemistry of the particle. One is very simple and the other enormously complex. But it also depends on its mass, its size."

Clinically, the answer is less complicated and even more complete, the physiologic equilibrium in alkaline-saline medication being shown by the absence of palability, a test which is well within the comprehension of the merest tyro in therapeutics.

Rest and Exercise.—Perhaps the reader is favorably disposed to believe that further investigation in this direction will throw a flood of light upon the treatment of various types of nervous diseases, neurasthenia, hysteria, hypochondria, melancholia and insanity, and he will not be disappointed. But no one will remain obtuse as to which camp I belong—rest cure, or exercise cure—because I have shown the abnormal conditions, physical and chemical,

responsible for their development, at the same time indicating the physiologic and chemic means required to cause their disappearance. So-called "nervous" patients will now be able to arrange their plans much more to their liking. Instead of spending six weeks—or six months—in a sanitarium, followed by a pleasure trip of ten days, there will be two pleasure trips, the first of ten days' duration to reëstablish the normal physiologic equilibrium, the second, *ad libitum*, to recuperate from the exhaustion incident to the magnesium infiltration—and it costs no more to travel than to be confined in a first class sanitarium.

Causes and Symptoms.—For the purpose of enabling the reader to secure a fairly comprehensive and reasonably intelligent conception of the causes and symptoms of disorders of the nervous system, it will be necessary to pass in review a limited number of the many pathologic conditions requiring the services of a physician. It is a notable fact that many persons suffer for years, patiently or otherwise, from some slight nervous disorder, until forbearance ceases to be a virtue, when they consult a physician with the expectation of securing immediate and permanent relief. In short, they demand the impossible, and it is believed that a careful perusal of these pages will throw sufficient light upon the peculiar complications presenting to guard the intelligent reader against the unwarranted conclusion that a day of miracles has dawned.

Like all other finite projects, the chemic problem in nutrition has its limitations. Its value and efficiency depend entirely upon the integrity of the protoplasmic cell, the ultimate unit in both animal and plant life. While assuming as definitely settled that inorganic deposits (*of magnesium*), constitute a serious obstacle to the successful warfare against disease, it does not follow that such deviations are always amenable to medical treatment. When the organic cells have lost their organized characteristics and cease to functionate, even after removal of foreign substances, their ability to recuperate is wholly dissipated. Productive inflammation, with the formation of new tissue, entirely

different from the original, would be a contra-indication for medical treatment without a preliminary surgical operation to remove the obstruction.

Physiologic Basis.—Underlying the chemic problem in nutrition is an intelligent, logical, and scientific physiologic basis, fundamental in character, and when once understood, the treatment of disease is extremely simple—it makes for simplicity and efficiency. It develops the capacity for associating ideas, conferring upon a physician of ordinary intelligence such a keen sense of perspective and proportion that he gives the impression of possessing the fourth dimension.

Forms of Invasion.—The forms of invasion, or shall we say, the peculiar types of chemic deviation in magnesium infiltration, as elaborated in “Disorders of Nutrition,” are conveniently arranged under three distinct heads, as follows:

1. *Simple replacement*, as in the muscular twitching of children suffering from “summer complaint,” the jactitations in chorea (St. Vitus’ dance), and the worm-like or “creepy” sensation (paresthesia), after serious illness and surgical operations.

2. *Chemic transformation*, seen in neuritis, neuralgia, sciatica and lumbago affecting elderly persons.

3. *United with calcium*, occurring usually in advanced age, or in those prematurely aged from any cause, the later stages of paresis and locomotor ataxia, and always associated with high arterial tension with symptoms of general breakdown.

Infantile Paralysis.—While the types mentioned are distinct and demonstrable, it does not follow that they remain stationary and typical. On the contrary, in most instances, the disorder is progressive, one phase of the deviation overlapping the other, as in infantile paralysis. Usually occurring as a complication in bowel disturbance, scarlet fever or other ailments attended with high temperature and arrest of the secretions, the onset is sudden and altogether unexpected, because the acid excess (of the general system), permits or favors depletion of the lime content of the

nuclear proteid, when coincident or consecutive replacement by magnesium takes place, arresting the capacity for imbibition and effectually blocking the transmission of nerve impulses. While it is not denied that bacterial infection may be a factor in its production, the clinical results support the pathologic diagnosis—recent cases of infantile paralysis promptly recover when calcium in full medicinal doses is administered—due to chemic change according to the law of mass action.

This disease is progressive because, consecutive to the original defect, magnesium oxide (calcined magnesia), combines chemically with the organic colloids composing the nerve structures, and finally, the calcium salts unite with the accumulated deposits to produce calcification or develop new tissue (productive inflammation), and degeneration is complete.

Paresthesia.—The following record of an obstinate and typical case of paresthesia will serve to illustrate in part the preceding classification, at the same time, corroborating the claims advanced for simplicity and efficiency.

The patient, a man of fifty, weighing perhaps 175 pounds, slipped and fell on an icy pavement, causing dislocation of the knee-joint and fracture of the knee-cap. He was carried in the ambulance to one of the foremost hospitals in the city, where the leg was set and suitably bandaged. Later, a second operation was done to approximate the patellar fragments, and the patient's progress appeared quite promising, except for the muscular twitching, which prevented sleep. The employment of morphine afforded relief only for an hour or two during narcotism, while it seriously impaired digestion, and the patient, fearing that he might become addicted, flatly refused to continue its use. Other measures were tried in vain, and everything abandoned under the impression that the paresthesia must be due to pressure of the plaster cast. Its removal, however, made no difference, sleep, except from exhaustion, being impossible.

This gentleman being a personal friend, I visited him several

times during his ten weeks' confinement in the hospital, but on ethical grounds, refused to interfere until he returned to his home. He reached home shortly after mid-day, and began treatment, which gave him a fairly comfortable night. Continuing treatment the following day (iodo-calcium), he slept all night, the twitching of the muscles having subsided.

Spinal Section.—Section of the spinal cord in the dorsal region (the back), causes paralysis of motion and sensation of the parts below the point of section, with exaggerated reflexes of the legs. The counterpart of this, a pathologic condition, is found in the case of magnesium infiltration, when the factitious deposits involve both the motor and sensory nerve trunks, although the motor nerves may be seriously involved while the sensory nerves are but little affected, and *vice versa*.

Section of the anterior nerve root causes motor paralysis, with muscular atrophy; section of the posterior root causes loss of sensation. This is well illustrated in sciatica and Raynaud's disease. In the former there is involvement of the motor nerves and branches which interferes with tissue change and elimination, while the sensory nerve being less affected, is able to carry the sensation of pain.

In Raynaud's disease, there is contraction of the arterioles, due to the magnesium infiltration affecting the nerves controlling the caliber of the blood vessels (vasomotor nerves), as well as the trophic nerves—which govern nutrition—both motor and sensory nerves being similarly affected, when circulation is impaired and sensation abolished, leading to gangrene. Usually, but not always, attacks of this character are symmetrical, and involve the extremities, partial proof at least that Raynaud's disease is a local manifestation of constitutional derangement. Confirmation of the working hypothesis is seen as a result of medical treatment—conducted for the purpose of promoting magnesium dissociation.

Raynaud's Disease.—According to the accepted nomenclature, Raynaud's disease is classed with disorders of the

circulation, but according to my interpretation, it should be included with disorders of the nervous system, the initial lesion being hardening of the nerves, sclerosis, and this interpretation is fully confirmed by medical treatment, as suggested. The following report of a case was made up during the latter part of 1908, and I have made it a point to keep track of the patient since that time with a view to confirm or disprove the above deduction:

Raynaud's disease is frequently, but not always symmetrical, as illustrated in the following case; A year ago last November I prescribed for Mrs. S., aged 77, and apparently in robust health, who complained of numbness and "bleaching" of the index and second fingers of the right hand. This condition has been present for several years, and I was asked to prescribe for her—if anything could be done. The patient lives at some distance, and I did not see her again until a year later, when she told me that the medicine I had given her (iodo-calcium), had caused the numbness and discoloration to disappear, and that there was no indication of its return until mid-summer—July.

Since making the above record, I did not see the patient until September, 1910, when she again consulted me, giving the following history:

For at least a year past, she has suffered more or less discomfort in the throat; she locates the trouble at the root of the tongue. It seems that there is more or less constant pain with occasional sharp twinges. The ability to turn the head is somewhat impaired, because the neck is stiff, and besides, the patient is unable to walk with comfort or safety; hence, it is necessary when she goes from home that she has some one to accompany her. During this time, the patient has had advice from several physicians, besides a specialist, and I am told that a thorough examination shows no disorder of the membranes which would account for the persistence of the malady. Local treatment has been persisted in for the greater part of the time, sprays and gargles, but no internal medication has been advised.

Treatment in this case was precisely the same as that carried out at the time she suffered from numbness of the fingers, and as a result, the pain and discomfort in the throat, as well as the difficulty in using the tongue, disappeared entirely in ten days, but for some occult reason it settled in the back of the neck. However, the patient continued taking the medicine for a few days longer, until one day she experienced a peculiar nervous sensation, she called it a "shock," and after that the pain disappeared from the neck. She reported two months later, that there had been no return of the malady, and remarked especially in regard to her ability to go about attending to her household duties, visiting and shopping, without a companion. As to the "shock," my impression is that it resulted from reestablishment of the nerve conduction, an incident which has occurred in other cases.

Motor and Sensory Nerves.—Efferent or motor nerves carry impulses from the central nervous system to various parts of the body, while afferent (sensory) nerves transmit sensation to the central nervous system.

Morbid Reflexes.—When the nerve centers are obtunded, as in magnesium infiltration, the failure or inability to transmit motor and sensory impulses is indicated by what are termed "morbid reflexes"—the reactions being greatly exaggerated, or absent entirely. A normal reflex action is an afferent impulse followed by an efferent impulse independent of the central nervous system—a blow on the solar plexus inhibits (stops), the heart; a light tap on the tendon below the knee-cap, the leg being flexed, causes a reflex efferent (motor), impulse, when the foot is raised. Generally it is most convenient to test this reaction as an aid to diagnosis, when there is a suspicion of magnesium infiltration, because this test shows the condition of the nerve supply; when this reflex is abnormal, it is possible to discover other evidences to confirm or disprove the diagnosis of magnesium infiltration.

Locomotor Ataxia.—Thus, in *locomotor ataxia* the posterior columns of the cord are involved, leading to loss of sensation

and muscular incoördination, the patient being unable to stand with the eyes closed—or walk a straight line with the eyes open. In paresis, there is hardening of the brain tissues, with corresponding degenerative changes in the cord, and in both locomotor ataxia and paresis, we find associated degenerative changes in the arterial system, progressive in character. That such hardening (sclerosis), and other degenerative changes, are due, directly, during their incipency at least, to magnesium infiltration, is not difficult to prove in the abstract, concrete, illustrative cases being available in the clientele of nearly every physician in general practice.

Analysis of a typical case falling within this category will give a history of intestinal indigestion with acid excess, associated with or followed by mental hebetude or symptoms of mental incoördination and consecutive physical debility. The subject seems prematurely aged, and at first resorts to stimulants, strychnine or alcoholics, to overcome the depression. These methods failing, as fail they must, the patient is advised to seek rest and change of scene, and finally, a sanitarium is recommended—the treatment carried out in these institutions being merely a series of fruitless experiments.

Incipient Paresis.—The characteristic symptoms of *incipient paresis* lead naturally to a diagnosis of nervous prostration, and the patient is passed through all the various stages of treatment, not only without hope, but without benefit. Indeed, the patient's nervous state is such that hope and fear are so inextricably mingled that they cannot know what course is best to pursue.

Nervous Prostration.—The following case well illustrates the simple, purposeless, or vegetative existence of a person subject to nervous prostration:

The patient, an unmarried lady, upward of fifty years of age, has been employed in office work for quite a number of years. The responsibility is heavy, owing to the necessity for accuracy in looking after details, and although she had special advantages by way of vacations and lessened duties, she was

finally compelled to relinquish her position. At the first and only consultation, it was learned that the patient had been under constant medical treatment, both before giving up work, and for six months, while waiting for providential interference. A brief, superficial examination showed increased reflex (knee-jerk), indicating involvement of the motor nerves, and intensely acid salivary reaction—evidence of intestinal indigestion. This latter condition was fully confirmed by the gas-distended abdomen, while the facial expression showed anxiety and fear—she was so afraid that her absence from home would be discovered, when she would be compelled to give an account of her absence. As further evidence of uncertainty and timidity, the patient insisted that the directions for treatment should be written out, because of her poor memory.

Treatment was limited to restoration of the digestive capacity, and neutralization of the acid excess by means of the measures previously outlined. The usual instructions were given regarding diet, liquids being restricted, with milk and eggs excluded, and as a result, a few days later, she applied for her former position, and was reinstated within a week from the time she began treatment—where she has remained for nearly six years.

Under favorable conditions in respect to diet, occupation and environment, nervous prostration should not develop until late in life, say three score years and ten. The following case is placed on record, therefore, as a typical example of the disorder—and besides, it shows the fatuous efforts of modern skill in attempting to ameliorate or relieve the deviation from normal.

Mrs. W., aged 69, married, and the mother of a grown-up family, has been a semi-invalid for at least a year past, and previous to the first visit in September, she had been confined to bed for nearly three months—in order to secure rest and regain strength. Unfortunately, however, the “rest” treatment has not proven satisfactory; the patient has a poor appetite, suffers from insomnia—owing to intestinal indigestion, and

usually wakes up every morning about three o'clock, after which she is unable to sleep. The most formidable symptom in this case relates to the central nervous system; the patient is rather slow in her conversation; she finds it difficult at times to secure or pronounce the right word, and the entire left side during the last six months has shown well marked symptoms of paralysis.

She walks lame, and when an attempt is made to encourage her by congratulating her upon her apparently good physical condition, she becomes extremely nervous, tears come to her eyes, the lips quiver, and the chin begins to shake, all going to show that there is some profound disorder which interferes with the uninterrupted transmission of nerve impulses. Still, there has been no immediate or marked change in her condition for at least six months; in other words, typical cases of nervous prostration are stationary or progressive, and further, they are not amenable to rest coupled with the ordinary methods of treatment.

Examination of the patient shows normal temperature and respiration, the pulse is 70 beats per minute, receding in character, but the most noticeable factor in this case relates to the salivary reaction—it is very strongly acid. Involvement of the nerve structures is further confirmed by the exaggerated reflex of the legs.

Treatment in this case ordinarily would include medication for correcting the intestinal indigestion, but inquiry developed that this difficulty was probably due to unsuitable food, the dietary being principally liquids, including both cereals and crackers. To overcome this difficulty, the patient was advised to take no liquids until the end of the meal, cereals and crackers were interdicted, and in addition to this, she was advised to drink freely midway between meals, and at bed-hour, and as an aid to secure the faithful compliance with these instructions, she received the alkaline-saline treatment, which in itself creates a moderate thirst, and at the same time neutralizes acidity.

However, this alone would not be sufficient to effect magnesium dissociation—special treatment was demanded for which the indications were clear and distinct. This patient

returned two weeks later with the report that the indigestion had disappeared; that the insomnia had also vanished; in fact, the patient felt the need of an after-dinner nap, and slept all night besides. All symptoms of aphasia had disappeared, and power on the left side had become normal, so that the patient was able to use the left hand and leg as fully as before the attack of illness. She seemed rather put out that she had to make this visit, because she claimed that it was entirely unnecessary, she felt perfectly well, and was able to attend to her household and social duties without any further assistance.

The following record presents an interesting case of nervous prostration, the patient being a man 65 years of age, who first consulted me some years ago for multiple neuritis. I quote extracts from a friendly communication (February, 1910):

"After three months and a half of suffering and worthlessness, I feel that I am again coming to life. I have had no pains in my head since last Friday, and the day before yesterday (Monday), I resumed my work and am now able to give more than supervisory attention to my duties without causing the pain to return.

"I owe my improvement to electricity and rest. I have a 'home' battery and have used it three times a week, taking the current through my feet and hands, and along the spine. I need not tell you, therefore, how or why the excessive flow of blood to the brain was stopped. . . . The cloudy feeling about my brain has disappeared, but I am afraid to do any consecutive thinking."

Cases of this character are usually difficult to handle, and the long period of illness confirms this statement. By studying the chemic problem in nutrition, we can usually secure immediate and marked improvement. That is, treatment should be conducted for the purpose of promoting magnesium dissociation, and acting upon this plan, the medicinal supplies were sent direct. In the course of a

week, the patient sent a reply together with a report of his condition, as follows:

"I thank you very much for your note, and am happy to report great improvement in consequence of the medicines sent me. I discontinued them yesterday, having taken them for four days, and am feeling better than I have at any time since last October. The improvement is not merely in my head, but is general, and I have been more like myself for two days past. I now go home after a sure enough day's work with some life in me."

Treatment in this case included small doses of calcium iodide together with chloride of gold and sodium.

Abstract and Concrete Evidence.—As an abstract proposition in this case, we had to deal with chemic transformation, magnesium oxide combining with the organic colloids of the nerve structures—to interfere with the uninterrupted transmission of nerve impulses. Theoretically, this deviation will be ameliorated by rest, because magnesium oxide is soluble in weak solutions of carbon dioxide, but the accumulation of carbon dioxide would have little if any effect upon the new chemic combination already formed. Neither could water-drinking be expected to effect any considerable change in the secondary assimilation—rather the contrary. Exercise should be classed with rest, since it increases oxidation and favors elimination, but neither does it affect the chemic combinations referred to; hence, the necessity for waiting Micawber-like, for something to turn up. As the girl said to the cautious young chap who wanted to kiss her—"Why speculate on probabilities when it is so easy to secure exact data?"

Concrete evidence confirming the abstract proposition—in other words, "exact data"—is to be found by analysis of the plan of treatment—restore the digestive capacity, to prevent further decomposition and fermentation in the intestinal tract, coupled with alkaline-saline medication to neutralize acid excess and maintain as far as possible the

normal alkalescence of the body fluids and tissues. By restoring the normal conditions incident to metabolism, we reestablish active tissue change, when the abnormal chemic combinations are promptly dissolved and dissipated, and that too, without unnecessary delay.

However, when the abnormal conditions persist, as in neuralgia, neuritis, and notably in diseases of bone, recourse must be had to remedial agents which directly promote magnesium dissociation, either according to the law of mass action or by means of chemicals which dissolve and disintegrate the deposits by solution of the organic constituents—the inert inorganic matter then passes into the general circulation, to be eliminated through the usual channels.

Senile Changes.—As a rule, senile changes are first indicated by disorders of the circulation, calcareous degeneration (arterio-sclerosis), affecting the arteries, with increased tension, embarrassment of the heart and imperfect blood supply, but this is only a part of the morbid complexus, hardening of the nerves (sclerosis), and imperfect nerve supply (conduction), being constantly associated. In truth, it appears difficult to say which is primary, arterio-sclerosis or sclerosis of the nerves, although clinical observation points to hardening of the nerves as the initial and dominant factor. This deduction is warranted by reason of the brilliant results attending the treatment of pre-senility, where it is assumed that chemic changes, due to the action of magnesium oxide, have impaired function and thus interfered with nutrition—by causing contraction of the arterioles with increased arterial pressure. This deduction is not only logical, but it is in accord with scientific research and clinical observation—nerve section causes contraction of the blood vessels.

Sclerosis.—When sclerosis affects the trophic nerves, we have gangrene; involving the brain structures, we have endarteritis, a blood-clot or actual rupture of the vessel, with paralysis; if the nerve supply of the liver suffers, there is disordered function—with glycosuria, jaundice or inflam-

mation; as a result of sclerosis affecting the nerve supply of the heart, various symptoms arise, chiefly motor in character, since the *vis a tergo* is diminished, causing an imperfect blood supply to the brain—in such cases, undue excitement, over-exertion, or even an attack of indigestion, is liable to precipitate heart failure, the organ being insulated, a short-circuit; sclerosis affecting the nerve supply of the kidneys gives rise to degenerative changes in these organs, because arterio-sclerosis proceeds *pari passu* with the degenerative changes in the nerve structures.

Prevention or Cure.—Having now studied briefly the morbid conditions incident to sclerosis of the nerves, it remains to be determined what preëxisting conditions are responsible for its appearance, and what means, if any, are available for prevention or cure.

In view of the almost universal prevalence of disorders of this class, coupled with the alertness of scientists constantly delving into the mysteries of nature, the task appears herculean, but when studied from the viewpoint of the chemic problem in nutrition, the solution is almost ready at hand—intestinal indigestion with defective secondary assimilation and coincident acid excess, leading to certain chemic changes in the nerve structures, magnesium deposits being the initial, if not the causative factor.

Prevention is possible in direct ratio with our ability to correct the disordered primary assimilation and overcome the tendency to acid excess, while a cure is produced or secured by promoting magnesium dissociation—three distinct lines of treatment, the demand for each to be determined by the conditions presenting. Still, the clinical side of the question is not always an open book, assuming that the medical attendant honestly desires to secure to his patient the most prompt results, owing to the formidable character of intercurrent complications, but attention to either of the three dominant factors never fails to show favorable results—there is improvement in that special direction.

Agraphia.—There recently came under observation a case of agraphia which fairly illustrates the principles advanced

relating to magnesium infiltration as the dominant factor in sclerosis.

The patient, a medical friend, 81 years of age, called to get a suggestion regarding the employment of a suitable "tonic" to overcome the tremulousness (palsy), affecting his right hand—said he was unable to sign checks. In addition to agraphia, there was at times more or less aphasia—he found himself unable to pronounce words—and the general condition, both mental and physical, indicated a complete breakdown as a result of sclerosis incident to senility. He said he had to think about his steps, and necessarily walked with great caution.

This patient is even now engaged in office practice, the vegetative functions are in normal condition, there has been no suspicious headaches, and the only history of illness dates back fifteen years, when two grains of corn lodged in the duodenum, causing considerable discomfort and alarm at the time. However, the obstruction passed *via naturales*, when the symptoms rapidly disappeared.

The present difficulty appeared following an accident—when a book-case toppled over on him, rendering him unconscious, how long, he is unable to say. The pulse was small in volume, unduly tense, about sixty beats per minute and regular; and the salivary reaction distinctly acid, simply the usual conditions found in such cases.

Treatment consisted in the employment of his favorite tonic, chloride of gold and sodium, together with small doses of iodo-calcium, approximately $\frac{1}{12}$ grain of iodine in the form of a decinormal trituration, three times a day between meals.

Of course, alkaline-saline treatment was clearly demanded, but withheld in this instance, because of the lack of confidence on the part of the patient. Although it was definitely explained that the disorder was due to beginning sclerosis affecting Broca's convolution, the motor centre for speech in right-handed people, the patient was firm in his belief that his trouble came from an injury sustained at the time of the accident.

In the course of a couple of weeks, the doctor called to say that he was all right again; it was then suggested that the

symptoms of defective elimination of bile required attention, succinate of soda being agreed upon.

A few weeks later, the patient called to complain that the malady was progressive, that he was even worse than at first, insisting that the outlook was very unfavorable. He was keen, however, to resume the iodo-calcium, because he could readily perceive the direct benefits. At this visit, we canvassed the disadvantages of the continuous acid excess, a strenuous effort being made to show that no decided and permanent results could be secured without reëstablishing as far as possible the normal alkalescence of the body fluids and tissues. Although the suggestion was new and novel, the doctor was disposed to regard the explanation as plausible, so we compromised on alkaline-saline treatment to neutralize acid excess, with iodo-calcium to promote magnesium dissociation, $\frac{1}{8}$ grain of iodine in the form of a decinormal trituration to be taken three times a day—between meals.

The above record refers to October 14, 1910, the last report, until I called him on the telephone, January 11, 1911, a period of three months, when the doctor said the agraphia symptoms had promptly disappeared under the treatment advised.

In this connection, I should mention that at the last date the patient reported having had an attack of "*la grippe*," which had left him with an irregular heart action, and he had been unable to leave the house for two weeks. Believing this heart difficulty to be due to magnesium infiltration affecting the nerve supply of that organ (a typical magnesia heart), I suggested that the same treatment would prove as effective here as in the case of agraphia—and it did. The patient reported over the telephone three days later that he was "all right;" that he felt fine the next day after beginning treatment.

As will be seen, this hypothesis simplifies medical practice in a marked degree. It corresponds with the precision in the addition and subtraction of fractions—after reducing to a

common denominator, or the proving of an algebraic problem—after determining the value of the unknown quantity. In all such cases, the suppositious unknown quantities, x , y , and z , are known, and their relative, if not their absolute value, may be determined by a critical study of the chemic problem in nutrition.

Within a few days, the doctor called at the office, having made a fairly good recovery from the "grippe." He said, when he began taking the tablets last week, he felt better in a few minutes after the first dose. His daughter, coming in shortly afterward, felt his pulse, said it was much better and asked if he had taken anything. Pulse intermits irregularly, about twice each minute. The salivary reaction is slightly acid and the patient seems to understand fully the significance of acid excess, but evidently does not believe it—thinks he should take the iodo-calcium more frequently.

The above case is given in detail for the reason that it is difficult to convince the general practitioner that these teachings are fundamental in character and will bear critical investigation—in the laboratory and at the bed-side.

Aphasia.—Loss of the power of speech is known as aphasia and is so closely allied to agraphia that both may be conveniently studied together. Aphasia may present itself in various forms, such as lack of memory for words (amnesic), inability to articulate words (motor), and inability to remember or understand words, the latter being designated sensory aphasia.

Of course, these different varieties or types are not found distinct, since they are usually seen overlapping each other, and besides, the serious character of the lesion is usually indicated by the degree or intensity of the symptoms. For example, in some cases, the patient will make prompt recovery, while in other instances, the deviation from normal persists for months, and to all appearances, the lesion is permanent, but the important fact should not be overlooked that both aphasia and agraphia are local manifestations of a constitutional diathesis. As in the case

mentioned, the attack of la grippe had shifted the symptoms of debility from the brain to the nerve supply of the heart.

Perhaps the first and most conspicuous instance of aphasia on record is to be found in the Bible—"the confusion of tongues" at the building of the Tower of Babel. In the Parable of the Prodigal Son, we also have symptoms of aphasia, when he "came to himself," and the peculiar characteristics of this malady, in connection with a dual personality, have been carefully woven into a most fascinating novel by the prince of word painters, Robert Louis Stevenson—*Dr. Jekyll and Mr. Hyde*.

More recently, other stories of like character with aphasia as a pivot have appeared, principally associated with the exploits of detectives, such as Conan Doyle's elaborate studies covering the investigations of Sherlock Holmes. Still, the stories relating to aphasia are not all imaginary; in fact, to state the truth, the cases occurring in real life are even stronger than those which are produced in fiction.

Thus, we have a record of a young woman who experienced lapses of memory, during which time her dual personality conducted herself in a most unbecoming manner. Finally, to escape disgrace, she arranged every detail for committing suicide, and was only prevented from the rash act by her other self, "Sallie," who realized that this suicide would mean death to her also. After that sad experience the patient made a complete recovery.

Another case is that of a Rhode Island clergyman, who strayed from home, took a new name, and finally wound up in a little town in Pennsylvania, where he established himself in business. Several weeks later, he, too, like the prodigal son, "came to himself," and was greatly surprised to find himself in a strange town with a new name, selling goods over the counter instead of spreading the Gospel from the pulpit.

To show that these cases are not confined to hysterical women, another instance, which occurred recently, is placed on record, that of a Philadelphian, who strayed into the police head-

quarters in Jersey City late in December, 1910, and asked the lieutenant in charge the name of the city, saying he was lost. He did not know his name, but had papers in his pocket which showed that he was a Philadelphia contractor, and that even then he had contracts for work aggregating \$80,000. He had been wandering about for two days, but could give no consecutive account of his movements. Later, he recalled that he was married, gave his wife's name; said he had three daughters, and he also stated the business in which he was engaged, the number of men he employed, and finally admitted that he had been sticking very close to business, and that the doctor had told him so. He had plenty of money in his pocket, but did not know how or where he got it.

Within a few days after the above was written there appeared in the newspapers an interesting account of a typical case of dual personality—that of a lawyer, 35 years of age, a State official, counsel for a prominent railroad, editor and owner of a country newspaper and well rated financially in his own town; he had been three times arrested in Baltimore for begging on the streets. When asked by the Justice why he did this, he is reported to have said: "I don't know. At times something comes over me and I cannot resist it. Then I go out on the street and beg money from the people. My other self simply got the best of me."

These records will go far to show the peculiar, intricate, and delicate character of the sense which we understand as nerve conduction. They will show how the motor and sensory nerves may be obtunded or obsessed, together with possible deflections from normal as a result of chemic deviations involving the inorganic proximate principles. Furthermore, it is believed that these recorded cases will serve to point directly to the cause, through the effects of medical treatment conducted for the special purpose of removing the obstruction to the uninterrupted transmission of nerve impulses. In other words, we reestablish nerve conduction by dissolving or dissociating the insulation.

A case is recalled which is more typical of the disorder as generally seen at the present day. During the winter of 1903-04, I was consulted by a merchant, 55 years of age, who gave a fairly complete record of progressive aphasia, together with agraphia, which had resisted the most approved methods of treatment for a long time. The attacks of aphasia would come on while he was talking with any one, either socially or on matters relating to business, and when engaged in writing—he used the typewriter—he would be unable to proceed with his work. When these attacks came on, of course, the only thing he could do was to stop; he found by experience that it was much better for him to make no effort, either to write or talk, when the interruptions in nerve conduction manifested themselves.

This, however, was not the most serious difficulty. He would have recurring attacks of illness, great depression, headache, insomnia, and it was necessary for him to remain in bed, and although he always had medical attendants, there was no perceptible or apparent direct benefit derived from medication. These attacks varied in severity; sometimes he would be laid up for a week perhaps, and then again, he would be away from business for a month or longer, and as a consequence, he became very much concerned about the outlook, although no neurasthenic element developed. The man was thoroughly practical, and had learned to take a purely philosophic view of the situation. He felt, however, that it was only a question of time when he would have to give up his business entirely.

During a period of six months, I saw him perhaps three or four times, and as a result of treatment in accordance with the plans here outlined, there was a very considerable improvement, although the aphasia and agraphia still persisted. During the following year I saw him less frequently, but treatment was conducted somewhat irregularly by correspondence, with the result that the recurrent attacks of prostration subsided.

The last attack of this character occurred about two years after the first visit. It was not severe, but I happened to find him in bed suffering from the usual symptoms and rather dubious as to the outlook. At this time I prescribed the usual remedies employed to neutralize acidity and promote magne-

sium dissociation, with the result that he recovered sufficiently to get about in the course of a few days, and was attending to his regular business within a week. Practically, no special treatment has been carried out since that time. The serious attacks have not recurred, and the symptoms of aphasia and agraphia rarely manifest themselves. Instead of giving up his regular business, he has engaged extensively in outside ventures, even taking the responsibility of management in more than one commercial undertaking, all of these efforts having been exceptionally successful.

Later, this gentleman gave me some interesting details relating to the critical condition attending his earlier attacks. He was prostrated and lying in bed, unable to speak or write, the attending physician together with other consultants, were discussing his case, supposing him to be unconscious—although he understood fully everything that was said. When the leading consultant declared there was no hope for recovery, he said to himself, “Old man, I’ll fool you yet, because I am going to get well.”

Old Age.—In confirmation of the foregoing deductions, let us take as an illustration a typical case of old age—and it is assumed that calcareous degeneration is well advanced at the age of eighty-six.

A medical man became very much interested in the theory of magnesium infiltration, and in our conversation, asked if it might be a factor in his father’s case. He said it was sad to see his father giving way as a consequence of advancing senility. Always active and energetic, within a year or two the evidences of advancing age were appearing fast—he was “tottery” on his feet, uncertain in his gait, unable to converse upon any well known topic consecutively, and yet from a physical standpoint, his health was all that could be desired.

Under the classification adopted, this case belongs to the third division, magnesium united with calcium. In accordance with the working hypothesis, however, it overlaps with chemic transformation, the second division, the initial deviation being

due to sclerosis of the nerves as a result of the chemic action of magnesium oxide upon these organic colloids. Consecutive to this, we have deposits of lime in the arterial walls—and more magnesium. The vessels are diminished in caliber, there is an imperfect blood supply to the tissues, while both motor and sensory impulses are impeded, owing to the electro-plating process which has taken place in the nerve structures.

Preliminary treatment was advised for the purpose of effecting solution of the lime deposits, small doses of aromatic sulphuric acid well diluted in water, this to be followed in ten days by alkaline-saline treatment. It was suggested at the time that barring accidents, calcareous degeneration might be delayed, and further sclerosis of the nerve structures arrested, by recourse to alkaline-saline medication from time to time, with a view to maintaining the normal alkalescence of the body fluids and tissues.

Although the advice was given seven years ago, and I had not seen the patient, reports have reached me that he has enjoyed exceptionally good health, and now, nearly ninety-three years of age, is still in the enjoyment of all his faculties.

DISEASES OF THE NERVOUS SYSTEM—CONTINUED.

WHY IS LAZINESS?

NEURITIS (Clinical Reports)—Causative Factors—Mercurialism.

WHY IS LAZINESS?

It seems stupid to ask so simple a question, and yet there is such a diversity of opinion upon this subject that it is worth while to consider the question in its various bearings. There is a general belief among scientists as well as on the part of the laity that the love of work and activity is an acquired rather than a natural tendency—this deduction being based upon the generally accepted view that human tendency is along the line of least resistance.

While these popular notions may seem warranted and applicable in some instances, it is very doubtful if this supposition can be established as a reliable criterion. Undoubtedly, this is true in general of different races and ancient tribes, but it evidently fails to convince the careful observer when applied to civilized people—this being shown beyond question in the marvelous achievements which have taken place, not only in this country, but in all other civilized nations.

Still, it must be admitted that laziness does obtain in a greater or less degree in every country; in fact, there is an indefinite percentage of lazy people the world over, and it is well known that many persons who are normally active, industrious, enthusiastic and progressive, including inventors, teachers, bankers, merchants and ministers, experience attacks of indisposition or laziness. Hence, the inquiry takes on peculiar significance. Laziness being admitted and a reasonable excuse advanced, it behooves us to make an inquiry as to the fundamental causes for its appearance—in other words, the question is—How is laziness?

Starting with the proposition or premise that laziness is essentially an evidence of lack of energy, we should make inquiry as to the original source of energy. M. Ribot—*Institut de France*—a well known medical scientist and speculative philosopher, has put this question in a very practical form, suggesting that energy is dependent upon two widely separate causes; that is, energy occurs or develops in two different forms, the one internal, such as foods, the other external, such as sensorial excitations. While this statement seems to be practical, it is still not available as an aid in our efforts to determine why laziness occurs, nor how it occurs. It will, therefore, be convenient to study the question from the two different standpoints, viz., potential energy and freed energy.

In other words, we must endeavor to discover, if possible, what interferes with potential energy to inhibit freed energy and produce laziness. Evidently, the defect lies in this direction, and if we can determine with a reasonable degree of precision what interferes with or impedes potential energy, we shall establish the fundamental basis for the appearance of laziness. In short, we shall be able to say just *how* laziness develops.

M. Ribot refers incidentally to the arguments which have been hitherto advanced to account for the vice of laziness. For example, moralists claim that laziness is due to lack of will power and that education is competent to deal with it. He also says that the psychologist has advanced the argument that laziness is of organic as well as mental origin. Furthermore, he states that scientists have discovered in such instances a lack of tonicity in the system, that the heart beats were weak and that arterial pressure was low. Such being the case, our scientific friends claim that laziness is due to lack of nourishment, the brain being imperfectly supplied with blood.

In this connection, he cautiously points to the possible tendency in the quality of blood which makes prohibitive any continued energy and concentration, and this theory seems to be well founded, because we often find these

patients suffering from anemia, although apparently well nourished. It is evident, however, that something tangible in every physical make-up inhibits the potential energy, so that they present all the usual symptoms of laziness.

Recent investigations by physiologic chemists have thrown a flood of light upon this important inquiry, by showing that chemic deviations in the nervous system are responsible for the physical depression as well as for the lack of capacity for mental concentration, and it is not difficult to understand how laziness may be brought about by what may be termed chemic deviations in the body fluids and tissues.

The human organism resembles in some respects the electric battery; having potential energy, it produces the current and this continues until the fluid is neutralized, when the current gradually ceases. Familiar examples are seen in the case of telephone and telegraph wires, where exhaustion of the potential energy results in failure to transmit the usual sounds. So it is with the human organism. Derangement arising from defective assimilation, primary and secondary, gives rise to an excess of acid in the system. This acid excess, of course, diminishes the alkalinity of the blood and hinders its capacity for carrying oxygen, so that oxidation is lessened, waste products accumulate, and thus interfere with the uninterrupted transmission of nerve impulses.

It will be apparent, therefore, that this condition may appear at any age, and thus produce the usual symptoms of laziness, although M. Ribot advances the theory that there is a certain analogy between the inertia of the so-called lazy man and that of the aged individual. In fact, he says that laziness is a kind of anticipated old age, although in this conclusion he is evidently in error. The fact is that laziness in early life arises from the causes stated, while the laziness of old age is due to senile decay with evidences of crystallization of the inorganic principles. In youth and adult life, it is quite possible to correct the "habit," while in advanced age, it is impossible to re-create or regenerate the wasted and infirm tissues.

While the chemic problem in nutrition is rather abstruse to the layman, to the physician it is readily comprehensible. For example, one of the first tests to determine the physical condition of the patient, that is, the status of the potential energy, is to test the saliva with blue litmus paper. Should this chemic test give an acid reaction—turn the blue litmus paper red, light pink, or bright pink—he knows that his patient suffers from an excess of acid, and like an electric battery, the nerve impulses are not properly and promptly transmitted. In other words, the excessive acidity of the body fluids has interfered with nerve conduction, and as a matter of fact, the patient feels indisposed, lacks mental concentration, and is averse to physical exertion.

Next in order, he will test the reflexes; that is, he will ask the patient to put one leg over the other, and then gently tap the tendon just below the knee-cap. Acid excess will then show that the reflexes are exaggerated, impaired, or absent altogether, and these evidences prove that the above statement is correct, that there is impairment in nerve conduction.

Examination of the heart will further confirm this statement. The action of this organ will be found lacking in rhythm and the contractions incomplete, so that the blood is not properly distributed throughout the system. This is further shown by feebleness of the pulse, evidence that there is lack of compensation, due to failure in the potential energy. It is similar to the condition found in mechanics. When the piston in the cylinder does not “cushion” properly it shows that there is lack of steam pressure.

So we might proceed almost indefinitely to point out the defects arising from lack of compensation or failure in the potential energy as a result of the chemic deviations in the body fluids and tissues, but this deviation to which we have referred is the beginning rather than the end of the trouble. The presence of acid in excess gives rise to chemic deviations affecting the inorganic principles, such as lime and magnesia. Lime being the stronger base, combines readily with the acid, by which process it is

eliminated from the body tissues, magnesium taking its place.

Thus, we have abnormal tissues, including nerve tissues, which have been depleted of their lime content, and unfortunately, replacement by magnesia, which is a non-conductor, interferes with the transmission of the electric current, the energy upon which the transmission of nerve impulses depends, so that we have to deal with magnesium infiltration. When this condition involves the nerve supply of the heart, it diminishes compensation; when it involves the brain, the magnesium deposits render concentration difficult, and may produce symptoms of paralysis even in young persons and those of middle life. We have examples of this following severe attacks of disease, such as diphtheria, scarlet fever, pneumonia and influenza. In the latter case, it is not unusual to find the patient seriously affected through this abnormal deviation, manifested by recurrent attacks of neuralgia, persistent neuritis, or possibly sciatica. In the case of children suffering from summer complaint, or even simple fever, we have infantile paralysis, for which there is no known remedy at the present time.

The successful treatment of these cases is likely to prove an interesting experience in the near future, from the fact that we now understand how the disorder is produced, what chemic deviations take place, and by proper measures we shall be able to neutralize the acid condition, at the same time employing suitable chemicals for the purpose of promoting magnesium dissociation according to the principles laid down in chemic text-books.

Finally, the disorders mentioned should be regarded as extreme evidences that chemic deviation is responsible for the more moderate symptoms recognized as laziness, brought about through attacks of disease. The distinction relates to differences in degree rather than in kind, and as a mere curiosity, it is a very simple matter for any one who feels that he is indisposed or lazy to test the salivary reaction as well as the reflexes.

This deduction may be popularized by means of a quaint

parody of an ancient and well known weather proverb, now recognized as a scientific fact and due to convection and radiation

“Evening red and morning gray
Help the traveller on his way;
Evening gray and morning red
Bring down rain upon his head.”

Saliva red and reflex gay
You know disease is on its way;
Reaction blue and reflex norm
You’ll wake in health the following morn.

NEURITIS.

For the purpose of showing concrete examples, confirming the claim for simplicity and efficiency, a limited number of typical cases are presented.

Under date of May 4, 1910, a gentleman, 46 years of age, and apparently in good health, consulted me for neuritis affecting the right arm and hand. The disorder had been present for a period of three months, and during the six weeks preceding this visit, he had received osteo-therapy, two or three treatments each week, but without any apparent improvement, except as to the digestion. Treatment in this instance covered three distinct indications: Hepatin for the impaired digestive capacity, alkaline-saline to neutralize acid excess, and calcium sulphate (gypsum) to promote magnesium dissociation, the latter treatment being determined upon, owing to the patient’s nervous make-up.

The patient resides some distance from the office, nearly 200 miles, and of course, it was not practical for him to make daily visits. He was requested to write after treatment had been continued for a period of two weeks, and the following extract from his letter, dated May 18, will serve to show the correctness of the therapeutic diagnosis: He says:

“The first let-up came Saturday, the 7th. Soon, was it not? I have pain the major portion of the time, but not nearly so severe. I am very grateful.”

Further treatment was prescribed, and the second letter, written on June 1, gives the following information:

"The pain in my right arm has entirely disappeared. My two fingers and thumb have a slightly dead and tingling sensation, and occasionally my forearm feels as though seltzer water was being injected therein. Aside from this, I think my arm is in normal condition."

Upon receiving this communication, a slight change was made in the treatment, the hepatin tablet being discontinued, and calcium carbonate substituted for the calcium sulphate, the alkaline-saline treatment being continued. Up to the present writing, over a year and a half later, there has been no return of any symptoms.

In the spring of 1909 I was asked to prescribe for a case of neuritis involving the fingers of the right hand, the pain being almost insufferable at night, so that it was absolutely impossible to obtain needed rest. The patient is a farmer, about 40 years of age, apparently in good health, and this disorder seriously interfered with his work, because he was engaged in dairy business, and was unable to milk his cows.

In this case, there is no history of indigestion, the man was active and industrious, and lived almost entirely in the open air; consequently, it appeared that very little medication would be required for the purpose of promoting magnesium dissociation. The only treatment was calcium iodide, moderate doses to be taken three times daily. In the course of ten days, when I saw him again, he said that the pain had all disappeared within a few days after beginning treatment, but there was a numbness remaining, and the strength of the hand was considerably diminished, but there was no pain either day or night.

Further treatment consisted in the employment of the hepatin tablet—two before meals—for the purpose of correcting any indigestion, affecting either the stomach or the intestinal tract, and a perfect recovery resulted.

Strange as it may appear, this patient had a similar attack a year later, and it occurred to me that I would transpose the line of treatment, giving first the hepatin tablet, with the reservation that if the neuritis disappeared from its employment,

calcium iodide would not be required. In this supposition, however, I was disappointed, the treatment for indigestion apparently having no benefit whatever upon the neuritis. Consecutive to this, he took calcium iodide, and all the symptoms disappeared in a few days, and that too, without leaving any numbness or lack of power in the hand.

In none of the cases mentioned above was a history of rheumatism elicited, and the following case is added merely to emphasize the contention that the disorders are separate and distinct. The patient is a man upwards of 50 years of age, and until three or four years ago has suffered from time to time from inflammatory rheumatism. The neuritis in this instance affected both wrists. There was slight swelling, more or less stiffness and constant pain, always worse at night.

Treatment in this case was conducted on lines parallel to that described in the above cases, and perfect recovery ensued within ten days.

The following record of a case classed as multiple neuritis well illustrates the deficiencies and short-comings in present-day medical practice. The correspondence gives such a clear description of the malady that it seems best to reproduce almost entirely the letter received from the patient, September 10, 1910, as follows:

"I am 32 years old and have always had perfect health; had the diseases common to childhood and also malaria six years ago. I am five feet, five and a half inches tall, normal weight, about 158 pounds, muscular and very strong. Live an out-door life and have never been sick. In all the examinations I have had the doctors found nothing whatever wrong. I am a brunette, but of light complexion, with rosy cheeks. My roses are all gone, and I have brown spots on my forehead and around the mouth. Have been married eleven years, but have no children or miscarriages. Have no trouble at all—all organs perfect.

"I am graduated from the Medical Department of . . . University, June, 1909, and in September located at . . . , where I practised medicine until August 1, when I was compelled to quit.

"I have had tonsillitis all my life, a chronic case—tonsils greatly enlarged. February, 1909, had the tonsils removed by snare. Was pretty sick after operation, the glands enlarging, both cervical and axillary. Got over that—though was studying very hard.

"In May, 1909, I awoke one morning with terrific pain in my neck, on left side, which extended down into shoulder—muscles all very tense and painful. The doctor said it was rheumatism and put me on aspirin. I also took some electric cabinet baths for elimination.

"Got over this attack, when the right side became involved. It was very severe, especially in the shoulder.

"About this time I got through college and went to my home in . . . I still had the enlarged glands in the neck and took calcium sulphide for that.

"Supposing the trouble to be rheumatism, I took all kinds of rheumatic treatment, including a couple of weeks at . . . Mineral Springs. All this time, I was taking aspirin in 10-grain doses to keep the pain down. After I located and started practising I got worse rapidly. The muscles of my neck were very tense and painful, and my shoulder also. My right arm became affected and the pain in it was terrible. It is a hot, nerve pain that never ceases, and when not under the influence of aspirin, I had no power to use it. Yet when I took 10 grains of aspirin, in a few minutes, I was comfortable and able to go about my work for three or four hours, when the pain became unendurable again, and I had to repeat the dose day and night.

"I took osteo-therapy and everything else my professional brethren suggested, or prescribed, with no success.

"December 15, 1909, the pain ceased suddenly and I was free from it for two weeks, when it began again, always starting in the neck behind the ear.

"I neglected to state that the pain crossed over, and the right side and arm were also involved, though not quite so severely. There were red spots where the nerve issued, and I had a temperature elevation from one and a half degrees to two and a half degrees every P.M.—none in A.M. Muscles were very sore and tense—could lie on neither shoulder, only on back.

"The next attack I had, beginning about December 28, started the same way and involved the same parts, the clavicles being very sore and the tissues over them swollen also. I became so ill, that April 12th I came here to . . . and consulted Dr. . . . , supposed to be the best man in the State of . . . on diagnosis. He diagnosticated the case as septic neuritis, although he could never find the origin of the sepsis.

"I went out to the . . . hospital, and stayed five weeks. Physician in charge gave me twenty hot alcohol packs, twenty hypodermic injections of sodium cacodylate, then put me on 10 minims of bichloride of gold and arsenic solution three times a day. I also had good food, egg-nog, and 5 grains of phenolphthalein at night; also a warm two-quart colonic flushing of salt solution each day.

"I was kept in bed at absolute rest, and was able to stand the pain without the aspirin after being there a few days. I lost thirty pounds in weight while there and when I left the hospital I was some better, but my neck still pained me a great deal.

"I left there May 19th. Went up to . . . and rested. Then, in a few days I had terrible pains through my forehead—of a neuralgic character—the tissues being edematous and very sore; also hot pains through my eyes that were very hard to bear. About June 15, 1910, though I got entirely well and felt fine for two weeks.

"Then I had another attack come on involving the intercostals (and entire chest), and diaphragm. Of course, the old troubles in the neck and shoulders came back and also through the forehead, but the intercostal involvement was the worst. I had this attack for about three weeks—bad, then it gradually let up. I never took any aspirin from April 17th until July 1st; then I had to go back to it.

"I came here August 1st, and rested, and took some baths, with light massage. I was comparatively free for two weeks, then this attack came on—came on with pain back of the ear, and then involving the shoulder. My right arm and shoulder have been as bad as they ever were. The chest has not bothered me any, except the intercostals, from about the 7th to the 10th,

which are very sore and have pained me a great deal. But this time, the worst phase has been my head. The pain in the forehead is very intense and throbbing; also sharp lightning pains through ears and eyes—paroxysmal.

"I am getting a little better now, but am still taking from 20 to 40 grains of aspirin daily. I have tried all other hypnotics and anodynes, but get no relief from any except aspirin. It seems to relax the tissues; feel like I had a cord tied round the base of my brain and drawing tighter. I take 5 grains of aspirin, and in five minutes I have relief. I keep my bowels open very freely, maintain good elimination, etc.

"I had my throat, nose and head examined last week and there is nothing wrong there.

"It seems that none of the doctors understand my case, and I am very anxious to get well. I have had to give up my practice entirely. The pain I suffer is terrible."

Truly, this is a serious case, most forbidding from whatever standpoint considered. Here is a fairly complete history of recurrent neuritis which has resisted all forms of medical treatment for a period of about sixteen months, and judging from the physical character of the patient, it should have been promptly arrested and entirely avoided. To the superficial observer and to the physician who is not conversant with the deviations from normal which have combined to produce the disorder, it would seem almost impossible to find an avenue of escape. Unfortunately, the chronic tonsillitis has misled the medical attendants, since there is a general belief prevalent that tonsillitis in childhood foreshadows rheumatism in later life. In this case, however, there has been developed neuritis, a tangent from the usual line, and since the medical profession is unacquainted with the pathologic bearings, it naturally follows that they should fail in their efforts at treatment—in fact, the evidence is clear that treatment in this instance has been according to routine and in conformity with tradition.

According to the classification adopted, there are three distinct indications for treatment, as follows:

(1) *Restore the digestive capacity*, the reason for this being indicated by the brown spots appearing on the skin;

(2) *Neutralize acid excess*, the demand for this being patent, because it is practically as well as theoretically impossible to have attacks of this character in the absence of excessive acidity;

(3) *Promote magnesium dissociation*, this being a *sine qua non*, as otherwise there would be no pain—the “hot nerve pain” which never ceases is a characteristic symptom of neuritis.

Treatment might be adopted in accordance with the above classification, beginning with the indigestion, and this could be readily combined with treatment to neutralize acidity, but it would not be immediately beneficial. In this case we have to deal with an emergency, and the physical condition of the patient is such as to warrant the belief that if the magnesium deposits were dissolved there would be prompt subsidence of the most unfavorable symptoms. Therefore, after studying the problem for a few minutes, it was decided to adopt the latter plan, sending the supplies direct to the patient. She was advised to take gradually increasing doses of the calcium carbonate (vitalized chalk), together with medicinal doses of calcium iodide, and requested to report the results of treatment after it had been continued for a period of ten days.

The following extracts from a letter dated September 26th, and received September 30th, will be sufficient to show the gratifying results following rational treatment: She says:

“When the supplies arrived, I was very ill, my neck and head keeping me almost insane; temperature of 102.5° and 103° every afternoon and evening. I was taking sodium iodide, 30 grains per day, and keeping down the pains with large doses of aspirin.

“I have now taken your treatment for ten days and am better. The neck has become much less contracted, the temperature normal with a rise of $\frac{1}{2}$ ° to 1° at night. My head is still painful, but the sharp neuralgic pains are gone, and more the feeling of

fulness than anything else. I feel stronger and much encouraged. My arm is stronger and the nerve pain practically gone. I have taken no aspirin for three days."

"On this date (September 30), alkaline-saline treatment was added and the report, received October 20, is as follows:

"Am doing very nicely. My left leg still pains me quite severely when I retire, but usually ceases when I get up. I walk lame when I first start out, but it soon wears off.

"My complexion hasn't cleared up much yet, and I am still troubled with constipation."

The symptoms given are simply evidences of auto-infection arising from the irregular flow of bile, and will be quickly relieved by continuing the alkaline-saline and the addition of the gall-ipecac comp., two tablets before meals. Magnesium dissociation having been effected, there will probably be no further demand for the calcium salts.

It would be an exceedingly simple matter to treat neuritis, provided all cases of this nature were alike, and it was not necessary for the medical attendant to entertain more than a single syllogism. Unfortunately, however, there is almost always a neurasthenic element associated with the disorder, the patients or sufferers, realizing the efforts made on their behalf by the medical attendant, become personally interested, not only in his success, but in the treatment of their own particular case, and adding to this the fact that many of these cases are mistaken for some occult manifestation of rheumatism, the difficulties in the way are almost insuperable.

This is well illustrated in the case of a patient coming under observation several years ago for some minor difficulty that his family physician had been unable to master. Recovery was so prompt that he felt warranted in asking me to prescribe again for him on several occasions, and also for different members of his family. He had suffered for some time from impaired nutrition, with a local manifestation or symptom characteristic of flat-foot, which was promptly relieved by shoes which

overcame this difficulty. He had an attack of influenza, but failing to get me over the telephone on Tuesday morning, he waited until Wednesday morning, at which time I prescribed for him, the consultation being conducted on the part of his son, while the patient was confined in bed.

The results of treatment were eminently satisfactory, except that neuritis had developed in the ankle as a sequela, and no doubt was associated with the defective nutrition which had manifested itself a year or so previously. For some reason, I was not asked to continue treatment for this, the family physician was called in, and gave him active treatment for rheumatism. This was continued for several weeks, the patient being kept in bed most of the time. Later, recovery was so far advanced that he was able to get out and still he had not regained his former physical condition; he walked lame, there was considerable swelling of the foot and ankle, and as a consequence, he lost his position, that of superintendent in a department store.

In this particular instance, I think it would be safe to say that the neuritis in the early stage could have been relieved at once, acid excess being doubtless responsible for its appearance, together with magnesium infiltration, and under ordinary circumstances, the patient would have been able to resume his employment without further loss of time.

While the foregoing statement may seem incredible in the extreme, and the claims impossible of fulfilment, it will serve the present purpose to supplement it with the record of a similar case, and at the same time it will show that there is warrant or grounds for the contention that the rational treatment of these cases makes for simplicity and efficiency.

The patient, a man, 49 years of age, has suffered six or seven years from a peculiar form of multiple neuritis—the attacks are confined principally to the legs; in fact, he says they never extend above the waist-line. These attacks are characterized by excruciating pain, both legs being affected, and in addition

to the pain, there is very annoying twitching of the superficial muscles.

The attacks come on without premonitory symptoms, and that too, without apparent cause—they are just as liable to appear in the middle of the night as at noon-day, and during all this period the medical attendants have never been able to prescribe medicines which afford relief; anodynes, narcotics, and antiseptics, and baths, and electricity, and mineral waters and everything else in the medical calendar having been employed in vain. He has been advised by eminent counsel, both at home and abroad; he has taken the "cure" at Nauheim, Germany, and the mud-baths in Hungary as well as the Carlsbad "cure" and sulphur baths (Budapest), and he says, in all his experience, all these lines of treatment have been absolutely without benefit, but on the contrary, these baths only left him in a less favorable condition than he was at the beginning, and the Carlsbad cure was the worst of all.

An examination shows acid salivary reaction with highly acid cutaneous reaction; the stomach is distended with gas, also the ascending colon, showing that there is gastro-intestinal catarrh, but he has a fairly good appetite, although the bowels are constipated. The knee-jerk is absent and all the characteristics of the typical magnesia heart are present, this peculiar condition of the circulatory apparatus being fully confirmed by edema of the extremities, although this latter feature is not persistent, appearing only when he has taken considerable exercise on foot.

In this instance we have a distinct demand for the correction of the three chemic deviations outlined in the proposed classification—impaired digestive capacity, acid excess, and magnesium infiltration.

Now, the reader must admit that these attacks of neuritis are due to some obstruction in the transmission of nerve impulses, and if we assume that impaired conduction is due to the presence of magnesium deposits, then it follows that medication conducted for the purpose of promoting magnesium dissociation should show immediate results.

Still, we must bear in mind that magnesium dissociation being a chemic problem, we cannot expect the living, organized tissues to part with it without some distinct or pronounced constitutional effects. For example, if this patient was to receive iodine alone for its alterative effect, it would produce such alarming "nervous" conditions that he would have to be confined to bed, or sent to a sanitarium where he would have a nurse in constant attendance.

Then again, suppose we assume that we have to deal with magnesium infiltration, the question arises as to the exact nature of this chemic deviation—Is it simple replacement, chemic transformation, or united with calcium? Each of these varieties or types require special attention in respect to treatment, as previously pointed out, but familiarity with this class of cases, taking into consideration the age of the patient, the acid excess, the gastro-intestinal derangement, together with involvement of the circulation, and also the sluggish condition of the lymph-glandular apparatus, there are grounds for believing that we have to deal here with chemic transformation, the colloid portion of the nerve structures having become charged with magnesium oxide (calcined magnesia). In addition to deciding upon this question, it was necessary to give some consideration to the digestive disorder, and the question naturally arises how best to adjust treatment to counteract the effect and remove the cause.

Briefly stated, the treatment consisted in the administration of alkaline-saline continuously; the second part of the treatment included the employment of calcium iodide together with calcium carbonate, small doses of each being given together about ten minutes before meals—the object in adding the calcium carbonate being to counteract any nervous irritability arising from the administration of the calcium iodide alone. Being unable to see the patient again for several weeks, he was advised to alternate the preliminary treatment with the hepatin tablet, two before meals, night and morning. That is, he was to take the alkaline-saline continuously and the calcium

salts for a week at a time, then followed by the hepatin tablet for a like period.

Nearly four weeks elapsed before the patient again made his appearance, and he reported that during the interval he had suffered no recurrence of the acute attacks; that he had felt decided improvement within a few days after beginning treatment, and that since his first visit, he had accomplished much more in the line of work than for many years. He had a good appetite, bowels were regular, he slept well, the reactions and reflexes were near normal, and he expressed himself as feeling well satisfied that he was now on the road to complete recovery.

The above being a recent case, of course, it will not be practical to consider the final results. However, it will suffice to report a somewhat similar case which came under observation, perhaps six months previous to the present writing.

A married lady, about 50 years of age, has suffered for a year and a half from neuritis affecting the right hand and shoulder. The pain is constant, night and day, and the shoulder is so involved that she is unable to use her arm, and for several months past at least, she must have a maid to dress her hair. It should be stated here that for several years previous to the development of neuritis, the patient had suffered from sciatica, so that in this case, at least, there seems to be an apparent relationship, but it is more imaginary than real, because it can be shown that the sciatica was due to long continued acid excess, a constitutional chemic deviation; and further, the deduction is warranted that the neuritis is due to the same cause, while magnesium infiltration becomes the complication.

The patient has had the best medical treatment obtainable, being advised by a prominent and popular leader in this section of the State. He had advised some lines of treatment which were carried out by other physicians, such as massage, and hot baths, and electric treatment, and he has winked at certain irregular methods of practice, such as osteo-therapy and mental healing.

The patient is an intelligent and educated lady, and could tell me when the ultra-violet light should be applied instead of osteopathic manipulations, and various other subtle and sophistic deductions, all gleaned from at least half a dozen practitioners and consultants. In fact, she had systematized the treatment to such an extent, that she had copies of the various prescriptions, together with samples of the medicines in a hand-bag, so that I could secure a complete history of the treatment—and she was greatly surprised, if not annoyed, when I told her that it was a very simple case. She afterward told me that she had become quite philosophic concerning the outlook, having made up her mind that medical science could do nothing to relieve the malady, and she was consoled by the fact that her medical attendants had not insisted upon amputation. She said, however, that she never expected to regain the use of her arm.

An examination showed acid salivary reaction, pronounced acidity of the perspiration, distension of the stomach as well as the ascending colon, and along with this was the typical magnesia heart. The patient was poorly nourished, the skin was dull and parchment-like, the appetite always impaired and constipation persistent.

Treatment in this case was conducted substantially on the same plan as in the previous instance. Medical treatment was begun on Tuesday and on Sunday morning following, the acute pain had subsided, the use of the arm was regained, and she dressed her own hair for the first time in several months, and, of course, she felt highly elated, but still rather suspicious and skeptical as to the outlook and ultimate results of treatment. In this, however, she was agreeably disappointed—improvement was rapid and complete recovery took place without any complications.

Causative Factors.—From time to time the appearance of neuritis has been assigned to various causative factors, such as over-exertion, physical or mental, the use of alcohol or tobacco, rheumatism, venereal disease, until finally it has been traced to putrefactive processes incident to impairment

of the intestinal digestion, proof of this being found by examination of the urine—indicanuria, from albuminoid decomposition, acetone-bodies (acidosis), from disassimilation of fatty acids, etc. To correct this abnormal condition and restore the digestive capacity, our main reliance hitherto has been intestinal antiseptics, quinine, salol, salicylates, etc., but the results have been far from satisfactory, owing to the temporary character of relief afforded, together with the tendency to recurrence. And this does not take into account the harmful effects of antiseptics upon the delicate tissues of the intestinal tract—like rust spots on a ten-dollar lace handkerchief.

Unfortunately, a test of the urine is misleading, because it gives but a superficial conception of the true cause, the presence of indican, acetone, skatol, and other putrefactive products being merely symptomatic, symptoms of defective primary assimilation—for all practical purposes, an effect. The true cause, it will be found, arises from defective innervation, due to impairment in nerve conduction, an interference evidently dependent upon magnesium deposits.

Contrast the simplicity and efficiency of treatment in the reported cases—without examination of the urine—with the complicated and long continued treatment usual in such cases, together with the unsatisfactory results, even with a restricted dietary, and we have a fairly representative composite picture of the short-comings in modern medical practice. For example, I have before me an elaborate report of ten cases treated according to the most approved and popular antiseptic methods, restricted dietary, with frequent urinary examinations—in one case several examinations were made daily for thirty consecutive days—and always a tendency to recurrence. No record is made of the time these patients were under observation, although we may infer that it was prolonged, because the author says, "In many instances, there were relapses from indiscretions, which the patients' desire for rich food led them into." Then follows a homely monologue on the subject of over-eating. Perhaps, another doctor, in reporting a series of

cases covering treatment of neurasthenia, a kindred disorder, will recommend rest in bed with forced feeding, while a third will advocate exercise and plenty to eat. Each has his following, because the public does not understand the chemic problem in nutrition, and the profession refuses to countenance a hypothesis so at variance with tradition—the innovation is not *ex cathedra*. The solution of the problem, it will be seen, rests upon a correct conception of the initial deviation as the true causative factor, the nerve obsession, rather than the putrefactive toxins, the effect.

Finally, it should be noted that neuritis is usually brought to the physician's attention in the chronic stage, associated with neurasthenic symptoms, and while medical treatment may prove successful in many cases, it is a fact that such patients are suspicious, skeptical, and unreliable regarding the fulfilment of details relating to treatment. Hence, I think that all such cases should be under the personal observation of the medical attendant, in a sanitarium, or in charge of a responsible nurse, who will see that the directions are faithfully carried out.

For example, it is necessary as a preliminary measure to promote dissociation of the magnesium salts, and this is best effected when the normal alkalinity of the blood is maintained. So, it becomes rather embarrassing to the physician who prescribes remedies for these two distinct objects to be told by the patient at the end of the week that he didn't take such and such, because he didn't think he needed it. This tendency of the neurasthenic to usurp the function of the medical attendant is unfortunate in the extreme. With proper attention to acid excess, remedial measures to promote dissociation of the magnesium salts together with a supply of the necessary calcium salts to restore the cellular activities, the treatment of these cases is remarkably successful, but it must be borne in mind that we have to deal with physical and chemical conditions, and unless medication is properly regulated to secure and maintain the physiologic equilibrium, failure must follow.

Mercurialism.—I cannot close this discussion without special reference to the “obscure nervous phenomena,” arising from mercurialism, and frequently manifested in patients who have been subjected to treatment for specific infection. It was Brunton, the eminent pharmacologist, who first pointed out the effects of mercury upon the tissues, showing that it has a tendency to deplete the lime from the bones, leaving them soft, affecting especially the long bones, and that in addition, there was a tendency to calcareous degeneration of the kidneys, leading to ascites and edema of the extremities.

A case of this character came under observation several years ago—a lady, 40 years of age, who, on account of swelling of the legs and dropsical condition of the abdomen, had not been able to leave her room for over a year, except to go down stairs once a day. She was apparently well nourished, but extremely nervous, the least noise or unusual occurrence leading to palpitation and trembling, and even a knock at the front door, or ringing of the bell would be sufficient to set up a “nervousness” that would last for the whole day. Insomnia was pronounced, and being unable to sleep, she would conjure up so many things that were likely to be neglected the following day, and then she would entertain fears regarding the household affairs, whether the furnace fire was properly banked, if the kitchen door was locked, if the front shades were pulled down, but under no circumstance would she venture out in the dark to investigate any of these suppositious short-comings.

The administration of calcium salts in small doses caused all these “fear” symptoms to disappear within a few days, and in less than a week she slept soundly. To show that she fully realized the change which had taken place, she said the old telephone bell could ring all night so far as she was concerned; it didn’t worry her a bit.

DISEASES OF THE NERVOUS SYSTEM—CONTINUED.

NEURASTHENIA (Clinical Reports)—Deviations Responsible for Its Appearance (Tabulation)—The Cause and Effect.

NERVOUS DYSPEPSIA—Gastralgia—Insanity—Goiter—Vomiting of Pregnancy—Review.

NEURASTHENIA.

That neurasthenia exists is admitted, that it is characterized by various symptoms, definite as well as indefinite, I cannot deny, but that treatment should be essentially psychic is a fallacy too elusive for the optimist in medical science—dirigation alone is a support too flimsy upon which to erect an ornate and substantial superstructure as a land-mark for future generations of physicians whose lives will be devoted to physical and physiologic demonstration whose keynote spells precision.

In a communication published some years ago,¹ I ventured the following observation:

In view of the numerous tangible evidences confirmatory of my contention in regard to the deleterious effects of magnesium infiltration, it seems that a record of "nervous" cases together with the treatment adopted would be a work of supererogation, so that I shall confine my remarks to several conditions which are representative of physical rather than metaphysical or psychological deviations from normal.

In this estimate, however, I was greatly mistaken, so as concrete evidence, several typical cases are now placed on record.

Whether or not my views are accepted, it is doubtful if we shall continue to read long articles containing directions for hair-splitting diagnoses between cardiac, dyspeptic and sexual neurasthenia, or which attempt to locate or describe

¹ Magnesium Infiltration, Wisconsin Medical Recorder, 1908.

the twilight zone between simple nervousness and typical or real neurasthenia, since it is now within the range of human probability to verify the clinical diagnosis by rational treatment, the crucial test of modern therapeutics.

Mrs. K. is an active, intelligent, and highly educated lady, 35 years of age, married, and the mother of three children. In fact, she presents the appearance of perfect health, and the suggestion that she required medical treatment was taken as a joke. However, after a brief consultation, it was learned that she had suffered all the characteristic symptoms of neurasthenia for at least a year past, and that she had been so wrapped up in the idea of alkaloidal medication that she had conscientiously remained in bed for a period of three months in order to get rest (?), and secure the benefit of the active principles of plants—atropine, strychnine, morphine, codiene, etc. The only benefit derived from this treatment, visible to the naked eye, related to the general physical condition—there was absolutely no perceptible change in the neurasthenic symptoms.

Treatment was begun on the plan previously outlined, but, unfortunately, the patient's peculiar make-up, prohibited the employment of alteratives, and it was impossible to employ the calcium iodide, even in small doses, because of the profound and depressing effect upon the nervous system. Indeed, it must be stated, that the results appeared almost alarming, and I was called to see her at her home, where I found her in bed filled with the most distressing forebodings. Modifying treatment, and limiting it to alkaline-saline medication and dissociation of magnesium according to the law of mass action, active treatment was carried out, which resulted in apparent and complete recovery in the course of a week. This claim is fully warranted by the subsequent history—there has been no relapse in eighteen months, and all the forbidding symptoms have subsided.

Mrs. C. came under observation seven years ago, a typical neurasthenic. For two years preceding her visit, she had been under more or less constant treatment for tuberculosis of the bowels. Apparently, judging from appearances and the history

of the case, the diagnosis was correct. Careful examination discovered, however, not only that we had to deal with magnesium infiltration, but also that there was a local lesion which had been overlooked by her previous attendants. It seems that the bowel trouble had gradually developed within a year after the birth of her child, and the attacks of diarrhea, appearing at irregular intervals, were such as to cause great prostration—sometimes ten, fifteen, or twenty bowel movements in the course of twenty-four hours.

As stated, a careful examination discovered the lesion; there was an arthritis or inflammation of the joint between the sacrum and innominate bone, on the left side (sacroiliac synchondrosis), and this was sufficient to account for all the unfavorable symptoms—including tuberculosis.

Treatment was conducted for the purpose of absorbing the inflammatory products, calcium iodide being employed, coupled with medication for the purpose of restoring the normal alkalinity of the blood, calcium carbonate in alternation with calcium sulphate, to which was added from time to time alkaline-saline treatment. This case was somewhat tedious on account of the debilitated condition of the patient, but perfect recovery ensued in the course of a few months, and there has been no recurrence of the symptoms of tuberculosis.

Mrs. S., age 30, came under observation several years ago, suffering from neurasthenia, as a result of shock. Standing on a railroad platform, she saw her mother killed by an approaching train, and of course, was seriously prostrated. While her physical condition was but little changed, the mental make-up was greatly obscured—she was timid, uncertain, and there was well marked panphobia.

As a result of treatment on the lines indicated, covering but a few weeks, this patient made a complete recovery, and for the past seven years has been engaged in active work as a teacher, enjoying perfect health.

Miss S. is an unmarried lady, 30 years of age, and for the past three years has been unable to do anything in the way of housework; she is afraid to mingle in society, and as a result

of the neurasthenia, she has become a nervous wreck. Consultation with several eminent physicians has resulted in no apparent benefit, and her medical attendant says nothing can be done for her, that she will have to wait two or three years, and take the chances of making a spontaneous recovery.

Treatment in this case, along the lines indicated, resulted in immediate and marked improvement. The patient became interested in her usual duties, enjoyed the visits of her friends and acquaintances, and took an active part in all social work, so that in the course of six months, none of the unfavorable symptoms remained.

Mr. P. is a man about 40 years of age, well nourished and apparently in good health, but he is extremely nervous, timid, uncertain, and had seriously considered the propriety of giving up his business—that of manager of a department store—so that he can take a much needed rest (?).

Treatment in this case was carried out on the general plan previously outlined, and the results were satisfactory, indeed. In the course of a few weeks he gained confidence. Timidity and uncertainty in regard to business affairs were changed to confidence, and as a matter of fact, he gave up the notion of taking a vacation. I only saw him three or four times, and had almost forgotten his existence, until one day, while dining in a railroad station, I was approached by an entire stranger, as I supposed, but presently he introduced himself, and I saw a man in perfect health with none of the untoward symptoms which had been present at the time he was under treatment—and he was profuse in his compliments.

While it is not common to find neurasthenia in males, such cases do occur, and the following record will demonstrate how neurasthenia is a direct result of magnesium infiltration.

A young man, 30 years of age, married, and fairly well nourished, gave the following history:

About a year previous to this visit, he had what the doctors called paralysis, the entire left side of the body being deprived of motion and sensation. At the time of this attack he weighed

perhaps 175 pounds, and was the picture of health. The only previous complaint that he made, referred to an acute or sharp lancinating pain in the back of the head—the occipital region.

Only partial recovery had taken place at the time of his visit; the headaches, while less severe, still persisted. The power in the left arm and hand had not fully returned, and occasionally he would experience a peculiar tingling pain from the finger-tips to the shoulder.

Ability to handle the left leg was considerably impaired; in fact, he had to walk with considerable caution when the pavement was slightly uneven, to avoid falling down on the street. This patient complained especially of nasal catarrh, with pain in the forehead above the eyes, together with frequent dropping of mucus in the pharynx. The digestion was very much impaired, so much so that the patient had hunted up medical literature, and fully convinced himself that he was the victim of constitutional syphilis. He claimed that it was impossible for any one to have ulcers in the mouth and on the tongue, such as he had, without syphilitic infection, and he was thoroughly convinced that he was then in the second stage of the disease, and that the attack of paralysis, a year previous, was conclusive evidence that he was right in his diagnosis—this was the neurasthenic element cropping out.

Treatment in this case was conducted strictly in accordance with the usual plan—to restore the digestive capacity, neutralize acid excess, and promote magnesium dissociation. In addition to this, however, he had suitable local treatment for catarrh. This patient was seen only once again, a month later, reporting that the catarrhal trouble had practically subsided, although it was in the month of March, when catarrhal troubles are most prevalent. He said the digestion had improved, that the ulcers in the mouth and on the tongue had disappeared, and that the difficulty in using the left leg had decidedly improved, but the neurasthenic element again developed, when he insisted that the left arm and hand had never troubled him. He admitted, however, that he had not suffered from headaches, and since that visit I have only heard indirectly that he is attending to his usual duties, and apparently enjoying perfect health.

In this instance, treatment was conducted for the purpose of correcting the constitutional deviation, the attack of paralysis being regarded as a local manifestation, due to long continued acid excess, diminished alkalinity of the blood, together with imperfect oxidation and defective elimination. There was no syphilitic infection, the mouth ulcers and catarrh along with some slight skin eruptions being due entirely to the indigestion. That they resembled syphilis was a mere coincidence, and the patient, finally, rather reluctantly, admitted his mistake in diagnosis, when the symptoms disappeared without specific treatment.

A well marked case of sexual neurasthenia, occurring in a male, age 54, supplies a typical illustration of the intimate relation existing between magnesium infiltration and neurasthenia—if it does not prove that the latter is the logical and consecutive result of the former. This patient had been ailing for a year or more, complaining of inability to work, suspicious of every effort made in his behalf, and throwing a “scare” into his family from time to time by his sudden ebullitions of nervous irritability. Spending most of his time in bed, he had beguiled his medical attendants at home and in the hospitals, into the need for anodynes and hypnotics to relieve pain and produce sleep, so that he gave promise of becoming a confirmed habitue, in addition to the original malady—because these patients fail to respond to the usual dosage.

The patient's digestive apparatus was in an extremely bad condition, the tongue heavily coated, the stomach and intestinal tract distended with gas, obstinate constipation, the salivary reaction highly acid, and the knee-jerk greatly exaggerated. The pulse was of fairly good volume, but receding, a characteristic of magnesia heart, this being confirmed by the accentuated or “snappy” second sound of the heart. At times, in such cases, we find valvular incoördination, but there was no valvular derangement in this instance.

Active treatment for a period of two weeks on the lines prescribed produced a marvelous change for the better. The patient was able to be up and around the house, and even ventured outside, giving directions for the farm work occa-

sionally. He took his meals regularly with the family and was such a good feeder that his wife jokingly talked of raising his board. During the time this patient was under treatment every precaution was taken to prevent him from discussing with any one his peculiar malady—by keeping him constantly in the family circle.

In the course of seven or eight weeks, while under observation, the patient made very satisfactory progress, but manifested no little disappointment when told that the original malady, although it came first, would be the last to disappear, that everything depended upon his ability to maintain his digestive capacity. At any rate, the outlook was not sufficiently propitious, and he insisted upon having another doctor before breakfast the next morning.

Now comes the most interesting part of the report. Within a week or ten days, the patient was bundled off to a more pretentious hospital, and it was given out that they would soon know what ailed him. The sanguine expectations were not realized, however, as he returned in a less promising condition than when he left home. He insisted upon having the doctor again early the following morning—who told him to get out of bed, and go about his business, that he was a sound man physically.

After this the atmosphere cleared, the man attended to his usual duties, and there did not appear to be a cloud on the horizon—until an attack of acute indigestion came on after a hearty dinner—and he died within an hour—in my judgment from magnesia heart, the organ being insulated—a short-circuit.

The following correspondence covers what might be termed a typical case of neurasthenia. The patient is a man, 57 years of age, a widower for the previous twelve years, and has been engaged in literary work, and also as a salesman.

The letter runs as follows:

“Four years ago, after hard work for many years, I had what the doctors called ‘nervous breakdown,’ and was away from business for a year—most of the time in the country.

“Up to that time, never weighed more than 130 pounds

since then have gained six or eight pounds every year, and now weigh over 150 pounds.

"Never paid any attention to my eating, and took little or no exercise.

"For the past four years or more have not been able to go about the city alone. Have had to have some one with me when out, and even when out with some one, have had to hold on to his or her arm. Experienced nervous fear even then, particularly in crossing streets. Want to walk close to buildings and fear that I would fall if I attempted to go in town any distance alone.

"In the country I am almost entirely clear from that feeling, but find that I have to occasionally take the arm of the person with whom I am walking, and always seem to be better able to walk on the right side of the person. In the country, I can walk alone, and do it without any fear.

"For years have had practically no knee-jerk, and except that I am not equal to sustained mental effort, either writing or talking, don't think that I suffer mentally, beyond being depressed at times, and a feeling of introspection—if that be the word.

"Except in election campaigns, when I would take stimulants to pull me through excessive work, have been practically a total abstainer for nearly ten years, beyond an occasional bottle of malt, ale, or porter.

"My chief troubles appear to be intestinal or nervous indigestion with constipation and acid excess. I have practically no pain, but my food ferments day after day, and my abdomen is nearly always gas-distended; my facial expression is almost always that of anxiety and fear.

"I may add that no doctor has suggested locomotor ataxia, but more than one has told me that my trouble was the opophobia form of nervous prostration. Not one could tell me whether the stomach caused the nervous trouble or whether it was the nervous breakdown that produced the stomach disorder.

"I am now on the second week of a two months' vacation, and hope to spend most of the time at the sea-shore, where I can get sea-bathing and perfect quiet.

"I should have said that I am easily bothered and excited, and that even a glass of malt at times flushes me as though I had been a hard drinker. Water, tea or milk sometimes has the same effect.

"Get off my sleep quite frequently—in bed some hours before getting to sleep—and rarely pass a night without dreams—many of them the "nightmare" variety. It is not an uncommon thing for one foot (sometimes both), to go to sleep while I am at meals."

While this has been an extremely obstinate case as regards treatment, it is clearly due to digestive disturbances, and as I wrote the patient that since the indigestion was still present, it seemed the part of wisdom to make an attempt to correct that before adopting measures looking to removal of the effects, meaning by that, the magnesium infiltration. Treatment, therefore, was conducted for this special purpose, copper arsenite as an antiseptic, together with the hepatin tablet to improve the digestive capacity, and along with this the alkaline-saline to neutralize the excessive acidity.

A suggestion was made regarding diet, as follows:

It should be limited rather than restricted, but no liquids while eating to help swallow the foods. Thorough mastication was advised, and the patient was instructed to avoid roast-beef and beef-steak, beans and meat-dressing, and all rich and highly seasoned foods. Further, he was instructed that there was no objection to ham, veal, properly cooked, poultry, eggs, fish, mutton and lamb. Vegetables included potatoes, white bread, graham bread, the latter to be taken sparingly, and the patient was advised to substitute rice in place of other starchy foods. He was also to take no oat-meal, cereals or other breakfast foods, nor crackers, because they keep alive the ferment in both the stomach and intestine. The patient was also cautioned that he must not understand that it is advisable or necessary to avoid liquids; that he could take water, tea, coffee or whatever he preferred at the end of the meal, or mid-way between meals or at bed-hour, but that he should discontinue the alcoholic stimulants entirely.

Two weeks later, the patient reported that he was making

some progress, but that he was still bothered with gas. He says, "My trouble has been a long time coming on, and I don't expect magical results; but, of course, I am anxious to get back to my business as soon as possible."

At this time the original treatment was discontinued, the patient being placed on treatment for the special purpose of correcting the chemic deviation, that is, magnesium infiltration. Treatment consisted in the administration of calcium iodide and calcium carbonate, small doses to be taken together about ten minutes before meals, the alkaline-saline medication being continued, and as a result, a letter was received about two weeks later, from which the following extracts are copied.

"I am so much improved as a result of treatment that I hope to get back to my home the present week, and start on my regular work.

"The indigestion is almost gone, and there is little or no gas trouble. Am more inclined to be constipated since taking the alkaline-saline less frequently. The knee-jerk is still absent, but am hopeful of its return after treatment has been continued a little longer.

"Am walking with greater firmness and confidence than for years, and am more than ever confident that your views in respect to so-called nervous disorders are correct. Am I right in walking six or eight miles a day? Or, I should perhaps inquire, is there anything in the magnesium infiltration idea that would make considerable walking undesirable?"

It seems scarcely worth while to comment upon the immediate and marked improvement following treatment in this chronic and rather peculiar case, but the results show the "how" and "why" of neurasthenia—that it is a manifestation of intestinal indigestion with acid excess, the essential cause, so that we come back to the original proposition: Improve the digestive capacity, neutralize acid excess, and promote magnesium dissociation.

Deviations Responsible for Its Appearance.—Before leaving this topic, it will be the part of wisdom to consider in detail

the factors or deviations responsible for its appearance, the fundamental basis of neurasthenia being an undiscovered realm. Literally, "nerve weakness," and defined as "a group of symptoms resulting from debility or exhaustion of the nerve centers," we have no definite or demonstrable evidence as to the nature of the cause. Theories in abundance have been advanced from time to time; analyses, abstruse, philosophic and physiologic, have burdened the pages of current medical literature, and authors have made text-books top-heavy with recondite discussions developing their own peculiar views—the toxemic theory, influence of the ductless glands upon metabolism, endogenous cell-fatigue, inadequate sexual reaction, constitutional and acquired as well as traumatic and senile forms, together with various clinical groups, but not until the presentation of the working hypothesis of magnesium infiltration has any attention been given to the chemic problem in nutrition, although one and all of these special, peculiar and intangible complications hark back to the chemic deviation.

Thus, while the cases recorded are typical, they are also characteristic, no two being alike clinically, but there is an unmistakable uniformity in response to treatment conducted with the single purpose—to promote magnesium dissociation, confirming the hypothesis that *chemic deviation is the dominant*, primary, or initial factor responsible for the disorder. This claim is based upon the assumption that we are dealing with a constitutional rather than a local derangement—a diathesis involving the motor and sensory centers, the nerve trunks and branches, also the vasomotor nerves—which modify, regulate, or control the caliber of the blood vessels.

It must not be understood, however, that this comprehensive scheme excludes the regional and local manifestations which are consecutive or secondary to the original deviation, because while the immediate effects may be diffused and scarcely perceptible, the remote, indirect or secondary effects may develop with unexpected emphasis in various directions.

Studied from the anatomic viewpoint, we have magnesium infiltration involving the cerebro-spinal nerves as in locomotor ataxia; with nervous dyspepsia, so-called, we have involvement of the splanchnic nerves; when the brain structures are attacked, we have melancholia, delusions ("brain-storms") and dementia, with insanity; consumption and tuberculosis, asthma and chronic bronchial catarrh follow invasion of the pulmonary nerve supply, so that pneumonia, pleurisy and influenza are found to be increasingly fatal; affecting the circulation, the effects are patent, more cases of apoplexy and paralysis, an augmented number of aneurysms, while heart disease alone is second only to tuberculosis in the aggregate number of deaths; the liver does not escape, shown by the long list of diabetics, the frequency of jaundice together with the numberless cases of indigestion, peritonitis and appendicitis, secondary to passive congestion and engorgement of this organ; the kidney function as well as the genital apparatus likewise claim a share of attention in the study of the regional effects of the diathesis, the former with congestions, gravel and Bright's disease, the latter with a multiplicity of obsessions, physical and psychologic.

Physiologic Deviations.—Turning now to the group of *physiologic deviations*, we have toxemia, arising from decomposition or fermentation as a result of impaired digestive capacity, or the development of systemic poisons as a consequence of reversion in cell function—musculo-toxin, neuro-toxin, hepato-toxin, pneumo-toxin, etc. Impairment in the function of the ductless glands—adrenals, spleen, thyroid, and pituitary bodies, advances *pari passu* with the constitutional retrograde changes, so that from a physiologic viewpoint, it may be said we have to contend with defective metabolism, involving the entire system of cellular activities. In other words, it obtunds or destroys cell function, and thus strikes at the fundamental basis of life itself—nutrition, exertion, motility, reproduction and response to stimuli.

The psychologic group of deviations, involving, as it does, the sexual apparatus as a pivot is, perhaps, the most impor-

tant of all, since it relates to the function of reproduction, or man's second nature. Elie Reclus has well said, "Until man's hunger and thirst are allayed, he is but little better than a ravenous brute."¹ When we consider the inexpressibly delicate nature of the physiologic mechanism relating to the function of reproduction, we must concede the possibility as well as the probability of injurious effects arising from causes which interfere with, impede or destroy the capacity of the nerve cells for the uninterrupted transmission of impulses, motor and sensory—such as attend magnesium infiltration.

The *incidental* or symptomatic manifestations in neurasthenia may be grouped under a separate heading, but the treatment of these symptoms, which is the limit in present-day practice, is like shooting up a blind alley at midnight—without excuse or reason.

The following schema will enable the reader to refresh his memory with reference to the various subdivisions as outlined, at the same time furnishing a convenient means of identification and clinical classification:

DEVIATIONS IN NEURASTHENIA (SCHEMA).

Dominant, (Primary):	Chemic:	{ Motor and sensory centers; Nerve trunks and branches; Vasomotor nerves.
	Anatomic:	{ Cerebro-spinal nerves; Splanchnic (abdominal); Visceral (brain, lungs, heart, liver, uterus, etc.).
Consecutive, (Secondary):	Physiologic:	{ Toxemia (intestinal, systemic); Ductless glands (impairment); Metabolism (defective).
	Psychologic, (Sexual):	{ Amenorrhea and dysmenorrhea— in females; Spermatorrhea and impotence—in males; Melancholia, panphobia, paresis.

¹ According to ethnographers, human development takes place in the following order: (1) Material, (2) family, (3) social, (4) intellectual, (5) religious, (6) moral.

Incidental,
(Symptomatic):

{ Lack of energy, easily fatigued;
Insomnia, impaired memory;
Constipation, dizziness, abdominal distension;
"Irritability," neuralgia, neuritis,
"spinal irritation."

Coming now to the final analysis, and reasoning or advancing from the simple to the complex, from the particular to the general, we must consider the facts, both clinical and scientific, isolated as well as in series, the latter being essential to the development of ideas. Later, by grouping analogous facts, we are able to establish the basis of a law, although a comprehensive exposition of disorders of the nervous system requires that the subject be studied successively from the viewpoint of biology, anthropology (demography), anatomy, physiology, pathology, chemistry and finally, at the bed-side—by exact observers and faithful recorders—to the end that "survivals," intellectual fossils, shall be eradicated from our text-books. Paraphrasing a remark by Reclus, medical science should no longer be the "tilting-yard for fancies against opinions, for hypotheses against guesses. . . . Science and virtue alike, begin and prosper by the same means—by sincerity and by effort." This scheme of progression is but another name for medical evolution, but following the dictum of Aristotle, we should make facts the basis of theory, drawing a distinct line of demarcation between them and mere conjectures.

Let us see now, how this declaration dovetails with our original proposition—to advance from the simple to the complex. Here is a child who twitches during sleep. There is no apparent cause, but we assume intestinal decomposition with auto-infection. The domestic remedy is castor oil. Medical treatment will be conducted on one of the two lines—the recent graduate invariably gives antiseptics, while an older man, long in the traditional rut, gives calomel followed by Epsom salts. In either instance, the patient becomes a "prospect" financially, sickness is produced and recovery prevented. Therefore, it will appear simple to claim that immediate and permanent relief can be secured

by the judicious employment of the calcium salts in small doses—of course, the dietary may require attention—to recoup the lime depletion (of the nerve structures), thereby improving digestion and preventing intestinal decomposition, which gives rise to the reflex symptoms. Gritting the teeth, dreams, nightmare and visions are also well known reflex symptoms, although not confined to children.

St. Vitus' dance is a more complicated condition, because the "nerve weakness" develops as a result of progressive chemic changes—probably from magnesium oxide—so that nerve conduction is interrupted. In epilepsy, the conditions are again varied, and still more complex, but the chemic deviation is still the dominant factor, this being confirmed by the results of treatment. Acute mania completes the series of "analogous facts" bearing upon "nerve weakness," all of which are traceable to nerve impoverishment as a result of chemic deviation in respect to calcium alone—the proof being found in the results attending judicious medication for the special purpose of promoting magnesium dissociation.

Take another series of analogous facts intended to throw further light upon this important subject. For example, a child recovering from a severe attack of cholera infantum will develop various manifestations of chemic deviation consecutive or secondary to the disease, anatomic, physiologic and psychologic.

(1) *Anatomic.*—Under the first heading, we have the usual disorders common to infancy and childhood, lack of bone-making material, failure in growth, bow-legs, defective or painful teething, flat-foot, hydrocephalus, and other evidences of malnutrition. In adolescents, these symptoms are emphasized, and when manhood is attained there is found a physical condition much below par. In the case of girls, there is spinal curvature and defective muscular development.

(2) *Physiologic.*—In infancy and childhood we have to contend with impaired digestion, mucous catarrh, adenoids, polypi, susceptibility to colds as well as to the prevailing

seasonal disorders. In adolescents, the symptoms are emphasized, boys being effeminate, lacking in energy with dislike for either study or work, while the girls are neurotic, apathetic or precocious, many of them being unable to stand the strain incident to school work.

(3) *Psychologic*.—From the psychologic standpoint, in infancy and early childhood we observe precocity, nervous irritability, mental deficiency, chorea and convulsions, in short, a continued series of irregular manifestations of imperfect nerve conduction. In adolescents, these manifestations are even more marked, so that these children attain to adult age in an extremely unfavorable condition to begin the battle of life.

It is a pertinent fact that many of these untoward sequelæ may be entirely avoided, and none of them will fail to respond, at least, in a degree, to the measures previously outlined with reference to promoting magnesium dissociation, the only necessary factor in the case being careful observation as to the condition of the reactions, and it is believed that no better illustration can be advanced at the present time than that which is developed in the foregoing tabulation.

The Cause and Effect.—While the evidence is cumulative, showing that chemic deviation is the cause of neurasthenia and other disorders of the nervous system, it would be fallacious to assume that it is a cause *de novo*. Hence, the inquiry: What is the cause of the cause? This finds a very complete solution in a study of the various problems connected with metabolism and disorders of nutrition—which develops the fundamental basis—impairment in assimilation, primary and secondary, leading to acid excess with depletion of the lime content and coincident or consecutive invasion or deposit of magnesium salts, so that we have to deal with magnesium infiltration as an effect of disordered metabolism. As to treatment, the original proposition still holds good:

- (1) Restore the digestive capacity;
- (2) Neutralize acid excess;
- (3) Promote magnesium dissociation.

NERVOUS DYSPEPSIA.

The term, "nervous dyspepsia," is a clinical division, and applies in the case of a rapidly increasing class of sufferers who have not yet reached the neurasthenic stage—they may be said to occupy the territory between simple or ordinary indigestion and neurasthenia, the twilight zone. While they experience days of "misery," with nights of exasperating insomnia, the point of view is not altogether pessimistic, because they usually find some friendly doctor who will indulge their fancy by recommending a hypnotic to insure refreshing (?) sleep, together with "working" medicine to unload the lower bowel thus establishing a vicious circle—verily, "The last end of this man is worse than the first." When the financial conditions warrant, such patients are shunted or dragged to a sanitarium for rest or exercise, or possibly for electricity, mineral waters, massage, mud-baths, or hot-air, no effort being made to unfold or elucidate the chemic problem in nutrition. What with antiseptics to destroy the myriads of bacteria and infinite swarms of spores, pathogenic or otherwise—untold numbers of miraculous dietary lists, with quarts of sour milk (Bulgarian bugs of direct importation), the outlook for the nervous dyspeptic is most bewildering and kaleidoscopic.

What's the Answer?—Let the patient's condition as regards chemic reactions be restored to normal; let the diet, rest, and recreation be in keeping with his physical and nervous make-up and adaptability—then we can readily remove or correct the disability which is responsible for the untoward symptoms. Nature is notably conservative, responsive to the slightest variation affecting the environment and recuperative in a marked degree, but we must adopt the measures necessary to enable the cellular structures to functionate. The following selected cases will serve to illustrate the principles advanced:

A colleague residing in one of the Western states requested

a suggestion as to the treatment of what might be termed a typical case of nervous dyspepsia with its sequelæ. A letter descriptive of the case follows:

"I have a case where I wish to try your theory, and see how it will work out. My patient is a man 54 years of age and weighs about 200 pounds. About ten years ago he had a severe attack of optic neuritis, largely due to auto-intoxication. He recovered from this with good results. He has had at times a little eye trouble since, for which I have treated him. About a year ago he had an attack of aphasia, which was quite severe. He has been treated constantly since by one of . . . greatest neurologists and a general physician here. He has also had some eye trouble, which I looked after, but I have done nothing with the other part of the case. The doctors have done about all they can for him; there has been considerable improvement in his case as compared with a year ago, but he is not in a condition now to attend his business in any way. I have thought that this might be a case where your treatment would do some good.

"This patient has at times considerable gastric and intestinal fermentation. I shall be glad if you would write me how to handle this case, and the dosage in which you would use the remedies. I have made a test with litmus as suggested, and find there is an excessive acidity. The other doctors are at the end of their resources now, and are doing nothing for the patient. As they have given up, I told the family I would like to have a try at the trouble."

Apparently this is a rather complicated case, because in addition to the neuritis and aphasia, we have to deal with evidences of fatty degeneration consecutive to fatty infiltration. Unfortunately, my correspondent said nothing about the condition of the heart, the arteries, or the knee-jerk, and in giving directions for treatment, it was necessary to determine the therapeutic indications from his fragmentary report. However, the directions included calcium iodide in small doses, together with alkaline-saline treatment, the

object being two-fold—the first to promote magnesium dissociation, the second to neutralize acid excess and flush the tissues. The physician was advised to make a slight change in the treatment at the end of a week, one of the hepatin tablets to be given before breakfast, two tablets before each of the other meals, and he was also cautioned that in case the patient was subsisting upon a liquid diet, other treatment would have to be substituted—to improve the digestive capacity

About three weeks after advising treatment the following report was received:

“I write you again regarding my case of aphasia, and will give you a little more in detail the history of the case. The patient weighs about 200 pounds, and is a little under six feet in height. He is a business man, and has been actively engaged in large business deals. The attack came on somewhat over a year ago, probably largely caused by nerve-strain incident to completing a large contract. As I wrote you before, I had nothing to do with treating him at the time, but some months after the attack he came to me for treatment of his eyes.

“Before beginning the treatment suggested by you, I had an urinalysis made, both chemic and microscopic. The specific gravity was 1.022, and nothing abnormal was found. Everything about his condition showed excessive acidity, and for this reason it occurred to me that your line of treatment might be of value. There is nothing in the nature of arterio-sclerosis, the pulse is strong and regular, but softer than it should be. I think there is something in the remark that you make in your letter that there might be some fatty degeneration connected with the case. The patellar reflex is present, but not nearly as active as it should be.

“There has been a very marked improvement in the two weeks while I have employed the treatment suggested. I have used the alkaline-saline right along, the calcium iodide the first week, and the hepatin tablet the second week; now, I am starting on the third week, and have put him back on the calcium iodide again. There was lack of ability to pronounce a good

many words, but this (aphasia), was not complete; the mental condition was somewhat impaired; he could not get names of people he knew. Since taking this treatment, the mental condition has decidedly improved, and he has much less difficulty getting the words wanted. This part of the case shows a decided improvement. When he began treatment he said he could not use the right leg as well as the left. There was not enough trouble, however, to cause any difficulty in walking or to be noticeable when he walked, but he said he could not use that side as well as the other. To-day, when he was in, he said that the right side was just as good as the left, and he could use it just as well. He also said that he noticed an improvement in the last few days, which was very marked the way he could use the right side."

As usual, in this case there was a well marked neurasthenic element, the patient absolutely refusing to discontinue the employment of a popular hypnotic, because he was under the impression that he could not sleep without it. I was asked to prescribe a placebo and advise further treatment, but the complications were too serious to warrant my taking any further chances without a personal examination, since these are the cases which suffer from "short-circuit" and die suddenly without knowing what ails them.

Mrs. L. is a married lady, 40 years of age, and had frequent attacks of what had been called bilious headaches. She had been a semi-invalid for at least two years, and although she was subjected to a formidable abdominal operation nine years ago, there does not appear to be any direct relation between the operation and her present illness. The appetite varies, she has more or less cough with expectoration during the morning hours, and she is suspicious that she is suffering from tuberculosis. This suspicion seems to be confirmed by the general plan which has been carried out during the last few months. Until a week ago she had been confined to bed for seven weeks, receiving local and internal treatment for chronic laryngitis. There is a well marked catarrhal condition of the nasal cavity, and this catarrh also affects the stomach and intestinal tract, so that

the diagnosis would very properly be classed as gastro-intestinal catarrh. The nasal catarrh, the laryngitis, and the headaches are simply incidental manifestations or concomitants of the digestive disorder. The nervous element is indicated by the rapid pulse-rate, ninety beats per minute, but there is no elevation of temperature; the respirations are normal, and strange to say, the salivary reaction is neutral, thus showing that nature is making every possible effort to effect a cure. Further evidence of the disorder is shown by the sallow complexion, the skin where exposed to light being almost bronzed or mottled.

The treatment of this case was extremely simple—hepatin for the digestive disorder, together with calcium carbonate to replace the depleted lime content of the nuclear proteid, and, in addition, a local remedy for the nasal catarrh.

This patient made rapid improvement, and there was practically no change in the treatment during the time she was under observation.

Mrs. K., is a seamstress, about 50 years of age, and can only attend to her duties about two days each week, owing to lack of sleep. She suffers from persistent gaseous eructations, and she is strongly under the impression that she is suffering from cancer or some malignant form of internal disorder. The patient seems to be well nourished, but is extremely nervous and persists in explaining her view of the trouble. Examination shows that the stomach and intestine are greatly distended, due to decomposition and fermentation of food. The sleepless nights are brought about through auto- or self-infection. A point worth noting in this connection relates to the inability to eat anything for breakfast. As soon as food is taken into the stomach nausea immediately follows, but she is usually ready for the mid-day meal, and as a rule, eats heartily.

Treatment in this case was conducted solely for the purpose of reëstablishing, as far as possible, the normal condition of the digestion. In addition to the usual hepatin tablet, she received the copper arsenite, $\frac{1}{10}$ grain, both to be taken together before meals. By way of instructions as to dietary, this patient was advised to avoid roast-beef and beef-steak, and liquids during the meal were absolutely interdicted. Improvement in

this case was rapid, and complete recovery resulted after a few weeks' treatment, although the malady had long continued, and a point had been reached when it was a question whether she would have to give up her work entirely or enter a sanitarium.

Mrs. A. is thirty years of age, married, and the mother of one child, ten years old. For the past seven or eight years she has suffered more or less constantly from attacks of acute dyspepsia, occurring principally at night. Various lines of treatment have been faithfully carried out under the direction of numerous physicians—nineteen in all—during this time, and still she depends almost entirely upon domestic remedies, such as aromatic spirits of ammonia, whiskey, and rubbing, with or without liniments. The patient is well nourished, and were it not for the history to the contrary, one would say that she enjoyed remarkably good health. The failure to secure relief from these sudden attacks, together with the interruption of rest, two or three times each week, has caused decided depression, but the neurasthenic element has not manifested itself—she is hopeful, enthusiastic; confident that her trouble will finally be relieved.

Treatment in this case was very simple, the hepatin tablet together with copper arsenite constituted the principal treatment. The alkaline-saline medication was recommended temporarily, to be discontinued from time to time in the discretion of the patient. She was given special instructions, should any further attacks develop, to take the copper arsenite tablet at once, and follow with large quantities of water as hot as could be sipped, the basis of this treatment being founded upon the well known antiseptic properties of copper arsenite.

Fortunately, however, she never had but one mild attack, and with some slight treatment to correct the lime depletion, she made a perfect recovery. This statement is warranted by the subsequent history—nearly three years has now elapsed, and there has been no return of the nervous depression or the dyspepsia, but of course, the instructions as to dietary have been carried out with a reasonable degree of care, and that is all that is necessary to enjoy good health.

Mrs. N. is 30 years of age, married, and the mother of three children. For several years past she has suffered from obscure internal difficulty, and her medical attendant has insisted that there was no probability of recovery without an operation. The patient is very thin, but does not look emaciated, although a cursory examination shows that she is subject to intestinal indigestion, the symptoms being well marked abdominal distension, constipation, nervousness, insomnia, irritability and a general feeling of profound exhaustion.

In this case the treatment was conducted for the purpose of correcting the indigestion and restoring the lime content of the nerve structures, which had been depleted by the persistent acid excess. The pelvic tissues were greatly relaxed and as a matter of course it was necessary to support and relieve the relaxation, which was readily accomplished by means of the ordinary wool tampon, the patient being instructed to introduce it herself, and to adopt or maintain a suitable position in bed so as to relieve the pressure on the ovary.

As a result of treatment conducted for a few weeks, the demand for an operation had vanished, and the patient became hopeful, less irritable with her children, and secured comfortable and refreshing sleep.

Gastralgia.—Gastralgia, or neuralgia of the stomach, for the general practitioner, is usually an extremely difficult case to handle successfully, unless it happens to be distinctly rheumatic in origin. In the latter case, of course, treatment for rheumatism, along with regulated diet, will be sufficient to correct the disorder. When, however, the gastralgia arises from impairment of the nerve supply, as in the case of magnesium infiltration, such patients usually experience long years of suffering, going from one physician to another, until finally they give up hope entirely, convinced that they are suffering from some incurable ailment, such as cancer, ulcer, or some malignant infection, secondary to involvement of the liver.

The following case submitted to me by a physician of long experience in one of the Southern states is a fairly

good illustration of the persistent character of the disorder described above. By way of preliminary to asking advice, the doctor extends a high compliment in referring to the monograph, "Magnesium Infiltration," saying, "It's the best article I have read in fifty years—every line is a chunk of gold. Will you kindly advise me as to this case?"

"A married lady, 23 years of age (I am the eighth doctor on this case), has, as I diagnose, gastralgia—bad digestion, severe cramps in the stomach, whether she eats or not, and fearfully constipated. It may be ulcer, but I hardly think so. She is afraid to eat on account of the severe pain. Since I have had the case under observation I can relieve the pain by Hoffman's anodyne."

With such limited information, the diagnosis and treatment of such a difficult case seems out of the question without a careful personal investigation. However, the question is not so difficult as it appears, because at least several of this patient's previous attendants have considered the rheumatic origin of the disorder, and therefore, it was assumed that treatment of the rheumatic element had proved unsuccessful. The next question coming up relates to cancer, but there is no history of emaciation, and besides, the patient is too young to have cancer. There is a possibility that there might be ulceration, although there is no history of hemorrhage, and this is very likely to occur in protracted cases. Indeed, there is a probability of more or less congestion of the mucous membrane of the stomach, and the persistence of pain, whether food is taken or not, is rather in favor of ulcer; but without the bleeding we can regard ulcer of the stomach in this instance as a remote possibility, and conduct treatment accordingly.

Assuming that we have to deal with magnesium infiltration affecting the nerve supply of the stomach, we can account for the pain, because the organ is partly insulated, that is, the nerve supply is defective, because of the electro-plating process which has taken place. We may also assume that the liver is similarly involved, and therefore, the output of bile is more or less irregular, the ducts, or bile canals, being engorged by the bile produced

through the cellular activity of the organ. Ordinarily, cases of this character develop jaundice, and it is probable that an attack of jaundice would have proved beneficial.

Coming now to the medical treatment, we must provide against the septic condition of the stomach. Necessarily, with constant pain and the usual flow of mucus, there must be a luxuriant bacterial flora, for which copper arsenite is available. In addition to this, we must adopt measures for the purpose of stimulating the liver function, and fortunately, we find the hepatin tablet an efficient remedy for this purpose, besides being a valuable combination to stimulate the secretions of the stomach. Further, it must be assumed that this patient could not possibly suffer from gastralgia, except as a result of continued acid excess, and thus, it is a very simple and easy matter to determine treatment—restore the digestive capacity by copper arsenite together with the hepatin tablet; neutralize acid excess by alkaline-saline treatment.

In writing to my correspondent advising the above treatment, it was suggested that if he would write me again after treatment had been continued for a week or ten days, I would prescribe further, explaining and demonstrating why he had the obstinate constipation, and promising to give the necessary instructions to secure relief.

My correspondent's next letter confirmed the therapeutic deductions, his report being as follows:

My gastralgia patient has had no pain in three weeks. I put her under treatment as suggested the day I received instructions from you.

Insanity.—It seems a far cry from the deterioration in wire fences to disorders of the nervous system, but the relation is closer and more direct than one would suppose, owing to atmospheric contamination. It is a fact that near the sea-shore as well as in the vicinity of manufacturing plants in suburban sections, which pollute the atmosphere with sulphurous gases, wire fences show rust more quickly than in rural communities. With an average of ten per cent. impurities in the city atmosphere, it is not

strange that nervous disorders, including insanity, are less prevalent in the rural districts, in consequence of the favorable climatic conditions.

No longer shall we hear discussed the academic question, "What shall we do with the insane?" because the evidence is clear that insanity as well as all forms of "nervousness" are due to demonstrable chemico deviations from normal, conditions in many instances amenable to medical treatment in accordance with the teachings here advocated. Hence, the inquiry will indicate a more hopeful aspect—in view of the rational, practical, and withal, the scientific foundation underlying the new departure. "What shall we do for the insane?" is destined to become the all-important question in the near future.

When we consider how sudden and unpremeditated an attack of infantile paralysis occurs, how unexpected the fatality in heart failure and apoplexy, coupled with the prompt relief afforded in the delirium of septicemia when the chemico deviation is corrected, there should be no mystery in the sudden onset of insanity. That the morbid complexus (syndrome), is difficult to understand is not denied, but the same is true concerning the hallucinations following the administration of *cannabis indica* (Indian hemp). However, the difficulties are not altogether insuperable when we come to a critical study of the chemico problem in nutrition.

Thus, usually, if not invariably, we have a history antecedent to the onset, of acute or chronic intestinal indigestion. Indeed, it happens not infrequently that auto- or self-infection, such as potmain poisoning, develops in juxtaposition with insanity, or that the latter condition is manifested in continuity, the toxic element being held responsible in both instances. In this study, therefore, we get a faint glimpse of *the cause of the cause of insanity*—evidently some derangement in nerve coördination, a tangled skein, to be sure, but not impossible of solution, because many cases of acute mania recover, as a result of, or in spite of, treatment.

This is notably true of puerperal mania, the insanity following childbirth. In these cases we have to deal with

a serious derangement in the nervous mechanism incident to the depletion of the lime content, this drain being coincident with the development of the embryo. With proper care and attention to the nutrition, such cases apparently make a spontaneous recovery. Although anodynes, hypnotics and other therapeutic measures are carried out in detail, no one has the temerity to claim that they are more than temporary expedients, conceding that nutrition alone is our main dependence.

Nearly ten years ago an illustrative case came under observation. The patient, a married woman, upwards of 30, and mother of several children, had been confined in the county insane asylum for several months, without apparent benefit.

While on a tour of inspection, the resident physician pointed out the patient, saying, "Doctor, I would like to do something for this young woman. She is the wife of a farmer in moderate circumstances, and the mother of a very interesting family of children. She was brought here three months ago, but shows no improvement. What can you suggest in the line of treatment?"

Testing the saliva with blue litmus paper, we found it highly acid, but there was no special reason, as far as the examination extended, to believe that this patient suffered from any other nervous derangement, except the magnesium infiltration. The treatment advised consisted merely in the employment of calcium salts to promote magnesium dissociation, together with the alkaline-saline treatment for the purpose of correcting or neutralizing the acid excess, along with a regulated dietary, and as a result, this patient returned to her home in a perfectly normal condition within six weeks.

Goiter.—In view of the evidence brought forward by Sajous and his followers, there is no occasion to discuss the questions relating to the influence of the ductless glands upon the vital activities. It remains simply to show how the chemic deviation designated acid excess affects the functional activity of these organs. Taking the thyroid

as an illustration, we know that it is composed principally of a colloid substance; hence, its susceptibility to magnesium oxide (calcined magnesia). When the conditions are favorable—acid excess from intestinal indigestion, with the coincident depletion of the lime content—the usual chemic deviation takes place, magnesium nucleo-proteids are formed, which lack the property of imbibition (absorption). Proof of this deduction is found in the immediate and marked effects attending treatment conducted for the sole purpose of promoting magnesium dissociation—as the following cases will show:

Mrs. R., age 35, married, no children, is apparently enjoying perfect health, but for several years past she has suffered from pain in the neck, location being central—in the thyroid gland. She has been treated for this difficulty by several physicians from time to time, but without obtaining even temporary relief. There is no heart trouble so far as can be learned, neither is there any fulness of the eyeballs and no pain, so that whatever nervous trouble may be present is due either to the nerve supply or to some defect in the gland. For all practical purposes it may be assumed that this is a question of minor importance, and assuming further that the disorder is due to partial insulation or to magnesium deposits within the gland itself, it would be logical to adopt treatment for the purpose of promoting magnesium dissociation. Acting upon this general proposition, the patient was advised to take the decinormal trituration of iodine (iodo-calcium), five tablets, three times daily, and she reported a few weeks later that the pain had all disappeared after a few days, and so far as I can learn there has been no return, although treatment was carried out over five years ago.

Miss S., age 18, is well nourished, and robust looking, and presents a picture of perfect health. Still, she has enlargement of the thyroid gland with projecting eye-balls, and suffers from "nervousness."

The patient first came under observation two and a half years previously, and the serious nature of the malady was

explained to her mother, but for some reason treatment was discontinued. This patient again came under observation with the symptoms of goiter more marked than at first. She was unable to wear a tight collar on account of the discomfort produced, and usually she adopted the plan of dressing her neck so as to hide the enlargement.

In view of the fact that this young lady has not attained her growth, coupled with the well known symptoms characteristic of magnesium infiltration—exaggerated knee-jerk, nervousness, irritability, and lack of confidence—the treatment in this case was clearly indicated. In other words, there was a demand for the calcium salts to supply the necessary bone-making material as well as the nerve tissues, the object being to promote magnesium dissociation according to the law of mass action.

Treatment was continued on this basis for nearly two months with the result that all symptoms disappeared, the patient becoming normal in every respect.

Vomiting of Pregnancy.—While this is a common disorder and usually causes no serious difficulty, and frequently disappears without being perceptibly affected by medication, it is nevertheless true that extreme cases occur in which an operation is demanded to save the patient's life. I have had within the past few years several communications from different physicians who have taken up with my suggestions regarding the employment of calcium salts, which fully warrant the claims advanced relating to the curative treatment of this malady. One case may be mentioned, reported by a physician of twenty years' experience, in which two previous pregnancies had been terminated by artificial delivery and the third threatened to be equally as serious as the other two, but with the administration of calcium salts, relief was afforded after a few days or a week, and the patient went on to full term without further complications.

Review.—The radical character of the teachings, coupled with the concrete evidences in support of the claims advanced,

will affect the reader according to his point of view. A limited number of doctors who have failed to receive satisfactory results from following the beaten path, as laid down in the text-books, will extend hearty welcome, volunteering to coöperate, by extending the advantages to their patients. Others, priding themselves upon their conservatism and regularity, and above all, their experience, will scarcely give the subject a second thought, claiming that the arguments are pretentious, sophistical and illogical, unworthy of credence, simply because they have never before been presented to the profession. However, it is confidently assumed that a dispassionate study of these questions must lead finally to an impartial decision on their merits, but it will not include those who are handicapped by the peculiar stereotropism incident to tradition.

It will be urged that the number of remedial agents—less than a dozen, all told—is too meagre to cope with the almost infinite variety of manifestations incident to diseases of the nervous system. That criticism might be answered by referring to the latest edition of the *Encyclopedia Britannica*—while the English alphabet contains but 26 letters, this voluminous work includes no less than 44,000,000 words. It is neither multiplicity of words, nor the geometric combinations possible from the remedies, which make for simplicity and efficiency; rather, it is in the discriminating employment of drugs in accord with the definite and unerring laws of chemistry. It is both rational and practical, and thus we have advanced one step further in establishing the art of medicine upon a scientific basis.

For the intelligent reader, who is but slightly acquainted with medical terms, it is not difficult to understand the significance between psychic influences and chemic reactions; nor can it be asserted with candor that he is unable to comprehend the importance of alkalescence as a factor in maintaining a normal health standard—and it is a very simple matter to test the saliva with blue litmus paper.

Rest and exercise are considered as merely temporary expedients in the treatment of nervous disorders, because

any benefits accruing must be in direct relation with the reactions arising from various chemic changes taking place in the nerve structures themselves, and so long as the physiologic basis is unbalanced—by acid excess—such changes are proverbially slow, and at best uncertain.

Studying the forms of invasion, or the peculiar types of involvement, when acid excess leads to abnormal deposits of magnesium salts with consecutive or coincident depletion of the lime content, the classification is simple, practical, and withal, in accord with scientific research. Further, it is amply confirmed by clinical observation and medical treatment, so that "he who runs may read." Indeed, when one is able to comprehend the motor and sensory functions of nerves, he can easily and readily determine whether one or both sets are involved—just as a merchant or banker can tell when his telephone connection is interrupted. Magnesium insulation is quite as effective in hindering the transmission of nerve impulses as the "grounding" of a telephone wire inhibits transmission of the human voice, because electricity is the energy responsible for both.

The plans relating to treatment are given sufficiently in detail in the recorded cases to enable any physician of ordinary intelligence to take up with the suggestions without any unnecessary delay, these being typical cases in the disorders mentioned, always provided, of course, that these special methods are faithfully adopted and not engrafted upon the routine and traditional methods in vogue.

DISEASES OF THE NERVOUS SYSTEM.—CONCLUDED.

INFANTILE PARALYSIS—Infectious Nature—A Working Hypothesis—Direct Treatment—Acid Excess a Factor—Technical Name—Specific Bacterial Infection—Treatment (Tabulation)—Experimental Researches—Mode of Invasion—Infantile Paralysis at Birth—Sepsis in all Disorders—Treatment after the Acute Stage—Clinical Reports—Quartation—Characteristics.

CHOREA—Definition—Causative Factors—Idiopathic—Septic Infection—Arterio-sclerosis—Athetosis—The Chemic Deviation—Paralysis Agitans—Huntingdon's Chorea—Tabulation (The Causative Factors)—Hysterical Chorea—Writer's Cramp—Pregnancy—Rational *vs.* Scientific (?) Treatment (Tabulation)—Rational Treatment (Tabulation).

INFANTILE PARALYSIS.

The original plan of this work included an entire section devoted to diseases of children, with a view to placing in the hands of the profession a complete exposition of the rational treatment of the disorders incident to childhood and adolescence, but the material accumulated so rapidly and the field of investigation expanded to such an extent—for a sketch—that it had to be recast. However, I have included in these final pages a presentation of the principles which should govern or regulate the medical treatment of infantile paralysis and chorea, both of these disorders furnishing typical illustrations of the correctness of the deductions previously advanced.

But the reader should not be misled into believing that any attempt is made here to discountenance the present theories regarding the specific or pathogenic character of the infection in acute poliomyelitis; nor, should it be assumed that the line of treatment is calculated to antidote the infection, either directly or indirectly, immediate or remote, since it has to deal exclusively with the effects. Still, the suggestion is offered, that in all severe ailments of children,

with continued high temperature, such as diphtheria, scarlet fever, measles, bowel troubles and even simple fever, it would be a wise precaution to neutralize the coincident acid excess, to the end that normal innervation shall be maintained. This innovation as a prophylactic is none the less significant and important because it is new or novel, since the *rationale* is amply confirmed by the teachings of physiology. It must be admitted that neglect of a fundamental principle neither nullifies, nor renders it obsolete.

In the case of chorea, hitherto one of the most intractable nervous disorders, the accompanying diagram will show at a glance the marked contrast between rational and so-called scientific treatment—while the former points unerringly to correction of the underlying chemic deviation, the latter is characteristically fluctuating and uncertain, simply because it lacks the essential basis of scientific accuracy. No cases are reported, for the reason that no material difficulties arise to confuse the mental picture incident to the treatment of any particular disease in which magnesium infiltration is the complication—and every physician should be able to recognize this chemic deviation just as any student in geometry recognizes that the three angles of a triangle are equal to two right angles.

Infectious Nature.—The infectious nature of infantile paralysis has long been recognized, and various theories, more or less plausible, have been put forward—but the end is not yet. In studying the chemic problem in nutrition, we sometimes have to work backward, first determining the effect of the disease upon the tissues—in short, the pathology—at the present time, a *terra incognita*.

Evidence of this is to be found when the peculiarities of treatment are considered, as the following extracts from a "Symposium,"¹ on this topic will show. The first contributor says:

"The physician should realize that he is dealing with a general infection involving all the organs as well as the entire nervous

¹ Journal of American Medical Association, October 22, 1910.

system and apply the same general principles of treatment as in other infectious diseases; hence, the important principle of treatment is elimination. This includes thorough depurative action on the bowels, the ingestion of a liberal amount of fluid to promote excretion from the kidneys, the use of remedies to stimulate diaphoresis, a liquid, nourishing diet, and proper temperature and ventilation of the room."

The second is from the pen of a neurologist, as follows:

"No reference has been made to medicinal treatment, for the simple reason that I know of no drug which has the slightest effect upon the spinal lesion, or on the paralyzed muscles after the acute stage has been passed. I am very certain that injections of strychnine or of arsenic are absolutely useless, though there can be no objection to the use of the ordinary blood and nerve tonics, provided the practitioner keeps in mind that he is attempting to improve the general condition of the patient, and is not endeavoring directly to effect a change, either in the spinal cord or in the paralyzed nerves and muscles."

In conclusion, this writer says he pins his faith to intelligent gymnastic exercises, adding: "We have no right to claim that any case is a hopeless one, and much can be done by properly directed therapeutic efforts," meaning, of course, mechanic stimulus.

The first is rash in the face of ignorance—in fact, the line of treatment advocated is a notable display of ignorance. What possible advantage can be gained from depletion when the nervous mechanism is at a stand-still? Such measures might be available under rare conditions—when the revulsive effect is expected to produce a stimulus—but not in the case of infantile paralysis when the vital functions are at such a low ebb.

The second contributor confounds the first by his absolute disbelief in any remedial agents in the line of drugs, but he is far from the practical side of the question when he insists that treatment should be confined or limited to "improving the general condition of the patient." On the contrary,

treatment should be conducted for the special purpose of effecting a change, a chemic change, in "the spinal cord, and in the paralyzed nerves and muscles." In view of the utter condemnation of all medicinal measures, it is difficult to reconcile his hopeful attitude as a result of "properly directed therapeutic efforts."

A Working Hypothesis.—Now, as a working hypothesis, reasoning in the abstract, we assume that as a result of infection, or of inflammation arising therefrom, factitious deposits have occurred in the nerve structures to hinder, impede, or destroy their capacity for the transmission of impulses, motor and sensory. From Loew's interesting, instructive and illuminative work, we have learned that an acid will deplete the lime content of the nuclear proteid and that coincidently or consecutively, magnesium replaces it, the transformation resulting in a magnesium nucleoproteid, which lacks the capacity for absorption (imbibition), and is therefore unable to functionate.

As in disease we have to deal constantly with an acid excess, the hypothesis of magnesium infiltration by replacement is plausible—and what is more to the point, we can demonstrate or disprove the correctness of this theory by administering calcium—to promote dissociation according to the law of mass action—and overcome, relieve or cure the paralysis.

Undoubtedly, mild cases of infantile paralysis make a spontaneous recovery, by or through the means here indicated, because the calcium is in the body, the fluids, the tissues, and especially in the bones, and through the conservative processes of nature—*vis medicatrix naturæ*—it is taken from tissues having least demand for it and carried to other tissues where particularly needed. Moreover, any surplus is eliminated through the intestinal tract—in health, while in disease, with acid excess, the loss of lime is a constant symptom, the loss of magnesia being nominal. Such being the case, what unpropitious concatenation of circumstances aside from tradition, can be offered as an excuse or reason for "thorough depurative action on the bowels"?

This modern slogan is calculated to cause irreparable injury—in “clearing the decks for action,” the medical attendant is throwing overboard his most valuable ammunition.

Replacement, however, is not the only mode in which nerves become paralyzed. It was through the careful, systematic, critical and persistent laboratory work of Thomas A. Edison that we learned about the susceptibility of organic colloids to magnesium oxide. With the various magnesium salts present in the body, together with oxidase as a constant product of cellular activity, it is not difficult to understand how magnesium oxide may be produced and combine chemically with the organic colloids of the nerves, to destroy function.

The internal administration of magnesium in any form, therefore, is strictly contra-indicated, because it will certainly hasten, if it does not precipitate, the unfortunate *denouement*. Thus, when acid excess is the dominant factor in depleting the lime content, replacement occurs; later, when the normal alkalinity of the body fluids and tissues is restored, the danger arises from chemic transformation, the calcined magnesia uniting with the colloids composing the nerve structures.

Direct treatment for simple replacement has been suggested, and is immediately available, whether the paralysis affects the spinal cord, the nerve trunks, or the terminal filaments. The direct treatment for relief of chemic transformation must necessarily be determined from the known physico-chemic reactions. We have to deal with a new chemic product; hence, we cannot say that the carbonic acid of the body fluids will be sufficient to effect solution because magnesium oxide is soluble in weak solutions of carbon dioxide. This new product, fortunately, is amenable to alteratives, given for the purpose of acting upon the organic particles of the compound, when the inorganic portion is flushed out through the blood stream—which should be alkaline and carry sufficient carbon dioxide to hold the discarded magnesium in solution.

Acid Excess a Factor.—Evidently, the first effect is due to a cause, bacterial or otherwise, a contributory cause being the acidity. The logical deduction is, therefore, to remove or mitigate the contributory factor—that is, neutralize the acid excess, and lessen if we cannot remove the constant barrier. That acid excess is a serious obstacle to recovery is quite conceivable when we realize that it is abnormal—and so long as this abnormal condition remains, perfect health is impossible of attainment.

The progressive character of infantile paralysis arises from still another factor, the third division of the classification adopted—magnesium united with calcium. Whether it is replacement or chemic transformation, there is “reaction,” increased temperature and congestion with plastic exudation, and as the case advances, unless the exudate is absorbed, new tissue is formed, different from the original—and frequently we find calcareous deposits, brought about through the influence of the original deposits. The counterpart of this is seen in advanced age, although in childhood and adolescence, the tendency is rather to the formation of fibrous tissue.

Strange as it may appear, so-called infantile paralysis is not an infection confined to infants. Both adolescents and adults are equally liable, but not susceptible in the same degree—perhaps because they are better able to withstand the prostration incident to serious illness. When it is understood that this somewhat occult disorder is characterized by profound depression of all the vital organs, physical, mental and vegetative, the foregoing seems to be a logical deduction, although this is but a superficial estimate of the morbid complexus.

Technical Name.—Technically, infantile paralysis is known as anterior poliomyelitis, and usually occurs in the acute form—myelitis, inflammation of the spinal cord, and polio, meaning many or much, while anterior refers to the part of the cord affected—actually, the motor portion of the cord. The motor area for different muscles is found in the anterior cornua (horns) of the cord, and degenerative changes

affecting these areas lead to paralysis and atrophy of the respective muscles supplied.

In addition to this, however, we have central motor areas located in the brain which, when similarly affected, lead to paralysis and wasting of groups of muscles. In view of these well established scientific facts, it is difficult to understand how or why a bacterial infection should attack and expend its energy upon the anterior or motor area of the cord to the exclusion of the central motor area in the brain. Indeed, the systemic manifestations are so universal and pronounced that we must concede at least a degree of involvement of the central motor area.

Specific Bacterial Infection.—The question of specific bacterial invasion being unsettled, we are still compelled to admit sepsis in some of its multitudinous varieties as the exciting or causative factor, but until such has been isolated and thoroughly demonstrated, treatment must be regulated for the special purpose of counteracting the effects. In other words, we must determine the nature of the cause which produces subversion in the nerve structures—bacterial infection has nothing to do with its removal; it is here today and gone tomorrow, but the paralysis remains. It is not mental, else it could be eradicated by dialectics, according to the theory of Dubois; mere physical debility would show decided recuperative effects from improvement in the nutrition, but, unfortunately, these cases are progressive, and go from bad to worse; hence, we must consider the chemic problem in nutrition.

In my previous remarks I have pointed out the continued and persistent acid excess, coupled with diminished alkalinity of the blood as the causative factor in depleting the lime content of the nuclear proteid with replacement by magnesium, thus hindering, impeding or destroying the capacity for the uninterrupted transmission of nerve impulses. Not only does simple replacement occur, but chemic transformation may also take place through the action of magnesium oxide upon the colloids of the nerve structures—the only substance known to produce this effect.

These scientific facts, when aligned with the well known clinical facts, will serve to shed a flood of light upon the rational treatment of this most intractable disorder. In order to give this article a practical turn, I venture the following tabulation or schema as a partial outline of the treatment advocated:

TREATMENT OF INFANTILE PARALYSIS (SCHEMA).

- | | | |
|--------------------------|--|---|
| I. <i>Direct:</i> (?) | To overcome sepsis (bacterial invasion). | |
| II. <i>Collateral:</i> | { | Neutralize acid excess—alkaline-saline; |
| | | Promote magnesium dissociation: { Replacement — calcium salts;
Chemie transformation—iodine. |
| III. <i>Symptomatic:</i> | { | Fever: Arterial sedatives—gelsemium; |
| | | Suppuration: Calcium sulphide; |
| | | Pain: Acetanilide with caffeine; |
| | | Constipation: Mercury biniodide with podophyllin. |
| IV. <i>General:</i> | { | Diet and hygiene; |
| | | Inunctions, massage, baths; |
| | | Electricity, oxygen enemata. |

In the above schema I have placed a query for the remedy to overcome sepsis, awaiting laboratory reports identifying the infection. Although I have never treated a case of this character in the acute stage, I have fully crystallized my ideas on the subject of neutralizing or liquefying the infection—a vegetable microörganism (?),¹ but I will not intrude my views at the present stage of the campaign. Without boasting, however, it will be safe to claim that with attention to the reactions, as outlined above, under the head of “collateral” treatment, infantile paralysis can be prevented.

The collateral treatment is curative; hence, it is not illogical to claim that it is also preventive—and extended experience with hyperpyrexia in children is advanced as corroborative evidence. In fact, I do not think it is possible for infantile paralysis to develop while proper medication is employed to maintain as nearly as possible the normal

¹ A filtrate.

alkalinity of the body fluids and tissues. By so doing we prevent magnesium transformation, and thus escape the complications and consequences.

Experimental Researches.—The following summary of the essential facts relating to the infectious character of the disease is condensed from the experimental researches conducted by Dr. Simon Flexner, Director of the Rockefeller Institute for Medical Research, New York, the experiments having been made on monkeys:

“That the disease was infectious and contagious; that it was caused by minute microorganisms, too small to be seen under the most powerful microscope; that it entered the body through the mucous membranes of the nose and the back part of the throat, and that it was given off from the affected person through the same channels.”

With this knowledge it is possible already to control the disease to an appreciable extent, since the excretions from the cavities of the head can be disinfected and their presence made perfectly harmless to other persons. This is the first step in the extinction of the disease.

Another interesting fact brought out in these investigations was the similarity in many respects between the organisms causing infantile paralysis and that causing rabies. Both are too small to be seen; both are localized in the central nervous system, the infection first attacking the mucous membranes and then the central nervous system, and finally the brain; both gain entrance through the oral cavity. The organism responsible for infantile paralysis, however, is the smallest of all the microorganisms discovered, such as those of yellow fever, pleuro-pneumonia, foot-and-mouth disease and smallpox. All of these will pass through very fine filters without disinfecting the fluid in which they are contained, but the poliomyelitis germ is the smallest of all, and no filter has yet been found so fine as to strain out these tiny organisms.

The paralysis attending the disease, according to Dr. Flexner, is but an incidental symptom, being due to the

inflammation of the membranes, which obstructs circulation. The cure for this is to restore the circulation, which is possible only when the disease has not yet gained a firm foothold in the tissues.

Mode of Invasion.—Not the least important fact brought out by these investigations relates to the mode of invasion, since the general acceptance of this view, with the employment of a suitable antiseptic in the nasal cavity will, in all probability, effect a marvelous change in the clinical results—and not only in the case of infantile paralysis, but in every disease of an infectious or contagious character. Of course, it is not difficult to understand how diphtheria, pneumonia, meningitis, tuberculosis, influenza and other microbic disorders may invade the system through the mucous membrane of the nasal cavity, but it requires a considerable stretch of the imagination to believe in the curative value of such a simple procedure, not to mention its paramount importance as an effective prophylactic.

Infantile Paralysis at Birth.—Too much dependence should not be placed upon laboratory investigations, however, because they do not cover the exceptions to the general rule—for example, infantile paralysis at birth (congenital). The following is a case in point:

Male, age four and a half years, had paralysis of right side at birth, and although he has always enjoyed good physical health, there is absolutely no power in the right arm and leg. Still, there is not much atrophy, and the child manages to slide over the floor quite lively—on the left hip, using the left arm for propulsion.

Practically, there is no mental development, the child being unable to use a single word—his face is a blank.

Treatment, in accordance with the foregoing schema, was instituted with the distinct understanding that it was to be entirely experimental, and might be discontinued at any time. Besides internal treatment, the dietary was reorganized, with the result that in four weeks the child could creep on all-fours, using the right arm and leg as well as the left side; he could

place both hands on a chair or the window-sill and raise himself on the left leg, the right being useless, owing to impairment of the ankle-joint. Three weeks later he was fitted with suitable braces and soon learned to walk—with assistance.

By this time a marked change had taken place in the mental condition; he could use a dozen different words intelligently, and as the mother wheeled him through a department store, she overheard one lady say to another, "What an intelligent looking child!"

Notwithstanding the marvelous transformation, the father gave little credit to treatment, saying: "No wonder the child did not improve. We never knew before how to feed him."

I only saw the child six times in three months, treatment being discontinued for lack of appreciation—telephone messages to send a new supply of the medicine being regarded as more than discourteous.

An important question arises here as to the probable cause of paralysis—was it due to infection through the nasal cavity, to some form of sepsis transmitted through the circulation, or to magnesium infiltration incident to the diminished alkalinity of the maternal blood?

Replying to this inquiry, it will be readily conceded that infection through the nasal mucous membrane was impossible. Sepsis is not improbable, because the child was born during a lingering convalescence of the mother after a serious illness of typhoid fever. But the sepsis must have produced an effect upon the nerve structures, to obtund, but not entirely to destroy, function, else it would have been utterly impossible to institute any form of medication to effect the results described.

Coming now to the question of magnesium infiltration, I take it that sepsis was responsible for the initial lesion, that magnesium infiltration occurred consecutively—in consequence of the diminished alkalinity of the maternal blood—the warrant for this conception being found in the results attending treatment conducted for the special purpose of promoting magnesium dissociation.

Sepsis in all Disorders.—In this connection it should be stated that sepsis looms large in all disorders. For example, a dealer in “bad” eggs here in Philadelphia was recently brought before the court on complaint of the State Dairy and Food Commission. This man made a business of collecting “rots and spots,” breaking the bad eggs into large cans, and later freezing them. This frozen product was sold to bakers throughout the city.

Physiologic tests of these frozen eggs demonstrated their actively poisonous qualities. In the case of two guinea-pigs inoculated with eight drops, one of them died in twelve hours, and the other in eighteen hours. Later, three drops of blood from one of the dead guinea-pigs were injected into a third, and this one died in twenty-four hours. Post-mortem examination of all of them showed that the bacteria had spread throughout the system, causing death by paralysis. A careful bacteriologic estimate showed that the body fluids contained at least ten million bacteria to the cubic centimeter.

Treatment after the Acute Stage.—The following details relate to treatment after the acute stage:

To neutralize acidity, the alkaline-saline is notably prompt and beneficial—as regards *all* symptoms. The formula employed includes lithia, the alkali, sodium sulphate, the saline, with the addition of sodium phosphate, equal in amount to sodium sulphate. Happily, the alkaline-saline treatment is rarely demanded at this stage in the case of children, tissue change being sufficiently active to prevent reversion in function. In the case of adolescents and adults, however, acid salivary reaction is the rule and demands first consideration in treatment.

To promote magnesium dissociation there are two distinct indications, as follows:

1. *Antidote for replacement* is found in the calcium salts, calcium carbonate (vitalized), or calcium sulphate (gypsum), usually given in alternation for a week at a time in the form of a normal trituration, that is, equal parts of the salt and granulated sugar of milk. The first is given when we have

to deal with a strumous condition—malnutrition; the latter, when there is a lack of bone-making material—osteomalacia. The dose of the trituration for children ranges from two to five or ten grains three times daily, best given in the form of tablet triturates; for adults, the dose ranges from ten to twenty or thirty grains, best given in the form of capsules.

2. *Chemic transformation* in the nerve structures arising from the chemic union which takes place when magnesium oxide combines chemically with the nerve colloids, is usually relieved by the administration of iodine in the form of a decinormal trituration. The mixture is prepared by adding one part iodine to nine parts calcium oxide (IX trituration iodo-calcium), and this mixture is then subjected to mechanic trituration with an equal portion of sugar of milk, thus making a decinormal trituration, best given in the form of tablet triturates containing one-half grain of the trituration. The dose for children varies from two to five tablets three times daily, while adults take five tablets three or four times daily—but only when the stomach is empty, so that we avoid the formation of iodide of starch, an inert substance.

As to symptomatic medication, the tabulation shows clearly the indications for treatment of the various symptoms which manifest themselves during the subacute stage.

CLINICAL REPORTS.

The following selected cases will serve to elucidate, if they do not confirm, the preceding deductions:

About twenty years ago, two children, females, came under observation, owing to the alarming condition which had developed as a result of “summer complaint.” They had been for several weeks under the usual methods of treatment then in vogue, anodynes and antiseptics, and both had lost power in the legs—they were unable to stand or walk. Now, the question is, “Was this infantile paralysis?” Undoubtedly. Apparently,

these children were suffering from sepsis as a result of bowel trouble.

Treatment in these two cases was identical; regulation of the diet, with the internal employment of copper arsenite in small doses, and the result was perfect cure. Now, I have watched these two girls grow up to womanhood, and while they are apparently healthy, there have always been symptoms of deficiency, inability to keep up with their class in school, susceptibility to slight ailments, and I am satisfied that both have spinal trouble. Evidently only a part of this is attributable to the attack in infancy, the most serious difficulty being traceable to lack of proper food to maintain nutrition.

Another case is that of a boy, about two or three years of age, who returned to his home from a prolonged visit with relatives who subsist largely upon cereals and delicatessen. The child had not been home long before he showed marked symptoms of irritability, and was continually falling down and crying on the least provocation.

Improved nutrition overcame this difficulty, and during the past ten years I have several times seen evidences of this early attack, manifested by spinal irritation (rarefying ostitis), with considerable deformity of the pedal extremities (flat-foot).

"Katie," age six years, is a typical case of infantile paralysis. She is anemic, thin and practically helpless, the strumous diathesis personified, although there is no defective mentality. From early infancy she has had absolutely no control of her legs. When held up to make an attempt to stand, her feet spread out, owing to lack of power in the ankles, and she is unable to walk a single step, even with support. She also has spinal curvature—compound. For a year or more past she has had electricity and massage three times a week at an institution for crippled children, besides massage at home, all to no purpose.

On the day this patient was seen, six years ago, she was brought home fitted with the usual apparatus saddled upon these unfortunates, braces and shoes attached, weighing together not less than ten pounds, but unable to stand or take a step.

Treatment consisted in discarding the braces; massage was continued, together with the internal medication demanded to promote magnesium dissociation, and with a pair of shoes to support the ankles, she was able to stand alone in just sixty days. Gradually she began to walk, and for more than four years has attended school regularly, making very satisfactory progress. I saw this patient not more than five times while under treatment, and again, recently, when I talked with her teacher, so the record is now complete.

"Jack," age ten years, fairly well-nourished, first came under observation suffering from tonsillitis. In the course of the examination, it was learned that he had suffered from infantile paralysis when less than two years of age. Hearing in the left ear was destroyed, he was blind in the right eye, and had constantly dragged the right foot. An operation had been done to relieve contraction of the tendon so as to let the heel come to the ground, but he could not run nor go up stairs except one step at a time, favoring the right leg. It was suggested that power in the right leg might be improved by internal treatment, but like most people, the parents were suspicious that it might be wrong to interfere with Providence. It appeared to them that if anything could be done to relieve the "dragging," it would have received attention at the hands of the orthopedic surgeon who did the operation, because this surgeon had shown him before his class, spring and fall, every year. However, two months later he came for treatment, and as a result he was able to hop with the right leg in less than two weeks. Later, I learned that he had greatly improved, that he was able to take his own part at school, and had gotten into a fight, coming off victorious, although up to that time he had shown no disposition to defend himself.

Of course, this is what might be termed an aggravated case, the paralysis being accompanied by deafness and blindness; but I want to direct attention to the serious character of the diathesis, unless proper measures are taken to counteract the peculiar tendency to magnesium infiltration.

For example, this boy was brought in to see me recently, and his mother said he had experienced a shock. The boy said, "No, it was not a shock; it seemed as though a spear went through me"—from the abdomen to the head, and since that time he has suffered from "spots" before the eyes. While it is not certain, the probabilities are that these spots will disappear by or through the use of remedies which promote magnesium dissociation. Treatment advised at this visit resulted in the prompt disappearance of the "spots."

Mary H., ten years of age, weighs about 80 pounds, and is a typical example of the *effects* of anterior poliomyelitis. About two years and nine months previous to this visit she was thrown from a moving car, falling upon the right side. This accident left a wound on the right side of the head—upper part of the parietal bone—which has continued as a running sore. Notwithstanding the persistent use of local remedies, the wound refuses to heal—57 different varieties of ointments having been used in vain. Besides, we have a claw-like contraction of the fingers of the left hand, with very little power. The patient drags the left leg, the heel being scarcely raised from the floor, and she is unable to run, or walk up and down stairs without assistance.

In addition to this, there is pronounced lateral curvature of the spine, the crest of the ilium on the left side being at least one inch higher than that of the right. Three eminent orthopedic surgeons have been consulted, and in each instance the mother has been told that it would not only be useless to employ internal treatment, but they have also warned her of the dangers arising therefrom. The mother was very anxious to have another local application for the running sore on the head, but was told that it would not be necessary, as treatment for the paralysis would also heal the wound.

Treatment in this case on the lines indicated, resulted in prompt improvement, the patient being able to walk up and down stairs, not only with comfort but with confidence, in

three days. Two weeks later the wound on the scalp was practically well, and the power in the left hand had increased at least one hundred per cent., while control of the left leg and foot was so far improved that the child was able to go about without any difficulty.

The important feature in this case relates to the original malady, an accident, followed by sepsis. Another associated factor relates to diet. This child had the usual prominent abdomen as a result of "loading" up with cereals. Ten days after treatment was instituted the patient's aunt called, and in surprise, said, "Why, Mary, what has the doctor done with your tummy?" The abdominal distension had disappeared.

I should have stated that previous to the first consultation this patient had received electric treatment together with massage, but without any apparent benefit. The probabilities are that with attention to nutrition, and continued medication to promote magnesium dissociation, this patient will make a complete recovery, although time will be required to correct the spinal deviation.

In the above case we have a fairly complete illustration of the effects following septic infection as a result of an accident, and this brings us back to the original proposition, namely, that in all cases of anterior poliomyelitis, the central motor area in the brain is involved at least to some extent. The following case is placed on record because it shows clearly how we may have anterior poliomyelitis as a result of sepsis alone.

The subject is a man, 40 years of age, and has suffered several years from recurrent attacks of boils. I met this gentleman recently, and in reply to the usual salutation, "How are you?", he said, "I am much better since I returned from the country, but I had a pretty serious time last summer. I was operated upon for adenoids, and although the operator was a surgeon of wide reputation, it seems that an accident occurred—he must have struck the spinal nerve. You can see how my left hand has shrunk, and I have very little power in it; besides,

I have lost considerable power in the left leg." I said, "What are you doing for it?", and in reply he said, "Oh, the doctors can't do anything for that. My family physician told me that it would be useless, as well as dangerous to take anything internally, and that the only hope was that nature in time would overcome the defect."

Judging from observation and experience, I am under the impression that this idea prevails with the medical profession generally, and it seems like flying in the face of Providence when an effort is made to correct the delusion. This man, with treatment directed to removal of the magnesium deposits, would get rid of the paralysis in the course of a few weeks. As it is, the left hand will eventually show contracture, and the left leg will atrophy and become less useful than at present. In other words, this man faces progressive paralysis, and yet he knows that cure is an impossibility, simply because his family physician has told him so.

Quartation.—In the treatment of infantile paralysis, the physician is placed in a position like that of the metallurgist when given a sample of ore to determine whether or not it contains gold. The ore is first crushed, and even the most minute particle contains its fractional portion of the precious metal—usually associated with some other metal, iron, copper, zinc, lead, etc. In the assay process, which is smelting on a small scale, the resulting "button" found in the bottom of the crucible contains all the gold together with such other metals as have not been completely oxidized. The work is completed by separating or discarding the impurities, and this is also effected by oxidation. A cupel, made of ground bone-ash, is employed—the cupel readily absorbs the oxide of all metals, but since gold resists oxidation, it escapes, and is found in the form of a button of pure gold remaining in the cupel.

To determine both the gold and silver, the above described process must be supplemented by an operation known as "quartation," which illustrates mass action. Thus, it might

be assumed that heating the button containing both gold and silver with nitric acid would be sufficient to dissolve the silver content, but this is an error, since the estimated amount of silver to gold must be 3 to 1 to effect dissociation or "parting"—and this is the special and peculiar feature to be kept constantly in mind, if we expect or hope to promote magnesium dissociation in the case of infantile paralysis.

Characteristics.—By way of illustration, certain characteristics may be passed in review, as follows: When the effect is merely physical, such as paralysis with wasting of one or both legs, we can understand how it may arise from impairment in nerve conduction; when followed by mental deficiency, feeble-mindedness, or idiocy, our first assumption or deduction is notably confirmed; when degeneracy, epilepsy, or insanity develop as sequelæ, however, the evidence is overwhelming that radical changes have taken place in the nerve structures.

Following up this line of inquiry, just as the chemist proceeds with his work, we are confronted with several probable and possible conditions, first and foremost being sepsis, which can be mitigated, and in large measure controlled, through alkalescence in conjunction with medication to stimulate the lymph-glandular apparatus. In this instance we have to deal with a physico-chemic problem, and success or failure hinges upon our ability to establish and maintain leucocytosis—to the end that any tendency to suppuration shall be arrested.

Next in order, we have to deal with a problem which is purely chemic in character—the magnesium deposits, which impede, hinder, or destroy the capacity of the nerve structures for the uninterrupted transmission of impulses. Depending upon the character of the deposit, dissociation may be accomplished in three different ways, as previously elaborated. In recent cases the probable results are favorable, as the foregoing reports and those following will show. As the case advances in point of time, of course, it is possible that sepsis or infiltration, or both together, may give rise to new tissue formation, in which case the effects are permanent. Again, children and adolescents have a more

favorable outlook than adults and those of advanced age, not only because of the active tissue change, but for the reason that acid excess, or acid "habit" in the adult was alone responsible for the susceptibility to infection.

Spontaneous recovery from infantile paralysis is exceedingly rare; the same is true in respect to most cases where modern treatment is carried out in detail; and yet it is a fact that many cases which are exceptionally unpromising are not altogether hopeless, when rational measures are adopted for the purpose of correcting the chemic deviation, that is, promoting magnesium dissociation. This is well illustrated in the following case which was undertaken some time ago at the suggestion of a former patient. This gentleman had a friendly consultation with me in regard to his grandchild, then four and a half years of age, and up to that period had never shown evidences of intelligence, nor spoken a single word.

I did not see the child, and the treatment was carried on indirectly and somewhat irregularly, but the results have proven far more satisfactory than were anticipated.

This child at birth had spastic contraction of the fingers and toes. Perhaps a year or more elapsed before the contractions of the fingers relaxed, but the child was nearly three years of age before the toes relaxed, and this was later accomplished by means of shoes.

However, the shoes did not enable the child to walk; and, in consequence, arch-supports were employed with almost immediate benefit—the child was able to walk and run just like other children within a month. Several medical consultations had failed to afford any advantage or relief, and the different consultants, of course, gave their personal opinion as to the diagnosis. Some considered the child merely feeble-minded—giving encouragement to believe that in time it would show mental development; again, the diagnosis was given as idiocy, and the outlook hopeless; still, another diagnosis was that of confirmed cretinism, and of course, that meant a progressive disorder.

My impression of this case was that the spastic contractions at birth were due to sepsis, and that the resulting inflammation had led to magnesium deposits which interfered with mental development, although it was pointed out that there was a possibility that this inflammatory action had given rise to new tissue formation (fibro-connective tissue), in which case there would be no possibility of recovery, or even improvement.

Treatment was begun upon the assumption that the original deviation was due to simple replacement, that is, that the sepsis together with the acid excess incident to all cases of illness had caused depletion of the lime content of the nuclear proteid, magnesium taking its place. By administering calcium carbonate (vitalized chalk), in substantial doses, the remedy which is known to stimulate the functional activity of the nervous system, we could determine the susceptibility of the involved area. Fortunately, the experiment proved remarkably successful, the child making strenuous efforts to speak, but unable to use words, and seemingly excited because she could not be understood.

The deductions from this demonstration pointed to chemic transformation, that is, the colloid of the nerve structures had been charged with magnesium oxide. To make the matter still more distinct, it should be stated that magnesium oxide in the circulatory fluids had combined with the colloid or starch-like portion of the nerve structures to inhibit or interfere with function. In accordance with the teachings previously laid down in this work, therefore, treatment should be conducted for the purpose of promoting magnesium dissociation through disintegration, that is, dissolving as far as possible the organic constituents of the deposit. Therefore, the child was given calcium iodide in combination with calcium carbonate, the latter ingredient being added for the purpose of carrying out the necessary chemic processes incident to and characteristic of mass action.

As a result of this treatment at the expiration of four months, I have the following report:

"We think S. . . . is showing marked improvement now in a number of ways, and especially in her talking. She seems to be talking with more intelligence; that is, she will say things of her own accord and say them in the right place. For instance, when people leave, she frequently says, 'bye-bye,' without being urged, and when we take her to bed at night, or after dinner, she usually says, 'night-night'. She often says, 'how do you do,' or 'hello,' without being told to, and so with 'please, drink,' and other things.

"She occasionally starts a fight with her younger brother, and if she wants something that he is after, she either beats him to it, or takes it away from him. She is full of the mischief and often teases us—when we tell her to do something as long as she thinks she dares, then she will do what we told her to."

A subsequent report received nearly a month later is quite as encouraging, as follows:

"We think S. . . . improves steadily. She is always doing something—is never still a minute. Generally, she is amusing herself, the most of the time she is also bothering us. A week or ten days ago she succeeded in opening a closet door. A little while ago, too, she took her toy piano up stairs. She has a great notion of teasing us—that is, of doing everything except what she is told to do. She sings better—I mean carries tunes better than she did. I think she talks better, too, though she doesn't talk a great deal more. Yesterday morning she said 'hello papa,' of her own accord when I went to get her out of bed."

"The last report received, when the child had been under treatment about nine months, is as follows:

"It is hard to tell you the various ways she has improved. She is in excellent health; her eyes are bright, always busy, sleeps well, is growing fast enough, and enjoys her food. She is quite shrewd, takes her part with B., plays ball and other games with him, and does many little things he tells her to. Her greatest trouble seems to be in not knowing just how to go about doing things.

"She can take a book, turn the leaves, and name many of the

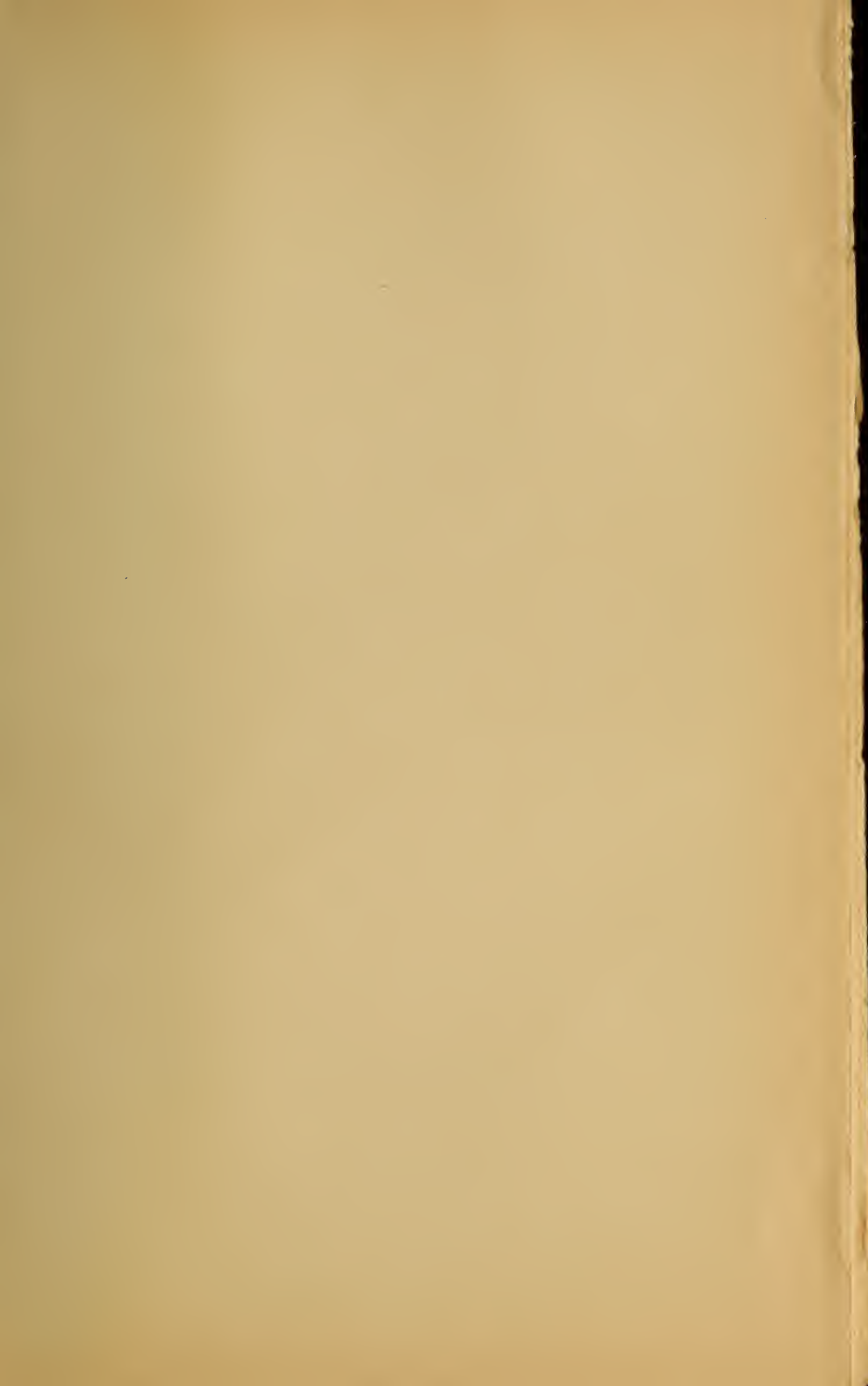


PLATE III



INFANTILE PARALYSIS.

Baby F., aged five years and two months.

PLATE IV



INFANTILE PARALYSIS.

Baby F., three and a half months later.

pictures, such as 'man,' 'boy,' 'baby,' 'kitty,' 'lady,' 'water,' 'ball,' 'bow-wow,' and many others. She will run to me and say, 'pease wock me,' 'pease down,' 'pease take me,' etc. She sings splendidly, carrying the tunes of 'Juniata,' 'In Zanzibar,' 'Little Drops of Water,' and some others. She is much easier to manage and minds fairly well. She shows signs of fear, especially of dogs."

The following case (Baby F., Plates III and IV), which came under observation nearly a year ago, and was treated by correspondence, will, perhaps, afford more conclusive evidence of the correctness of the working hypothesis than any of the cases so far presented. The parents live quite a distance from Philadelphia, and could not afford the expense incident to the trip. The mother writes, as follows:

"My little girl is now five years and two months old. Three years ago last December she was taken very suddenly with high fever, which continued for several days. When the fever left her she had no use of her legs. After some time she regained the use of her right leg, but the other has never gotten entirely over the paralysis. It is a great deal smaller and seems to be weak. Her walking is very poor; have never used braces, but have shoes for weak ankles.

"We have a splendid physician, and he has tried a great many things on her, electricity and also massage, but nothing seems to improve her very much . . . I have not sent to our physician for your prescription, for the simple reason that I was afraid he would advise against its use.

"Our little girl's general health is not as good as it was before the paralysis."

In this instance the mother was advised of the uncertainties attending medical treatment, but a supply of tablets was sent complimentary, with the understanding that if they produced any perceptible benefit she might regard the outlook as favorable. As a result of this experimental treatment, a few weeks later, the following report was received:

"We think she is stronger than when she began to take the medicine. Mentally, she is very bright, but is somewhat

nervous—but she was nervous before she had the paralysis. Her memory is good—she can retain anything.”

At this time a supply of medicine sufficient for several weeks was sent, calcium iodide and calcium carbonate, and also the directions in regard to the necessary shoes to support the ankles, the photograph received showing that there was a tendency to flat-foot, and that the left ankle was so weak that it could not support the body without assistance. About a month later a letter was received, stating that the child had had an acute attack of stomach trouble which was prevalent in the locality, and that the treatment had been temporarily discontinued. Along with this was a report that the child seemed to be improving until this attack came on, although the nervous condition had not improved.

Nearly a month elapsed before another report was received, when the mother stated that the patient had been wearing the shoes for a week, and that they seemed to aid her a great deal in walking. In addition, she said:

“Her left leg has begun to grow some, and the leg is stronger than it was before she began treatment. She lifts her left foot from the floor when walking, and she has gained five pounds in weight.

“We continue to massage the limbs, and have had her hair shingled as directed. The little girl’s memory seems better, and she has a great deal more energy than formerly.”

Two weeks later the mother reported that the patient still continued to improve, and that she could walk half a mile without resting.

Under date of May 20, the mother was requested to send a photo of the patient after the shoes had been worn for a period of two months, and at this time, I have a record of prescribing for the child on three different occasions, covering treatment for three months. The accompanying photos show the marked change attending treatment, the interval elapsing between the two being three and a half months. It should be added, by the way, that the photo shows that the ankles are not properly supported, and on its receipt, the mother was advised to secure more suitable shoes.

Comment on this case would be superfluous were it not for the imperative necessity of linking the prompt recovery with the correction of the chemic deviation, and that too, without the usual assistance supposed to be demanded in the shape of braces, manipulations, electricity and other superserviceable paraphernalia. It is in fact, a striking illustration of the claims advanced for simplicity and efficiency, and may possibly be accepted as a demonstration of the working hypothesis designated magnesium infiltration—the chemic problem in nutrition.

CHOREA (ST. VITUS' DANCE).

Chorea, as a disorder of childhood, is easily recognized, owing to the peculiar jactitations of the sufferer; its characteristic manifestations, confined to some local area, as the hands, the fingers, the toes, or the facial muscles in both children and adults, are generally regarded as a personal idiosyncrasy, and not as an evidence of defective innervation due to chemic deviation. Indeed, St. Vitus' dance, from time immemorial, has been looked upon as a mere symptom of some occult condition or mysterious concatenation beyond the ken of human knowledge. Within recent years the affluence of the harvest in bacteriology has created even more than a suspicion that this malady may also be the result of an hitherto undiscovered toxin which finds entrance to the system in some unaccountable manner. Why it should affect three times as many girls as boys has not yet been definitely "figger'd" out; neither have we any reliable data which will enable us to account for the identical symptoms arising from fright, over-study, or exhaustion on the one hand, and the sequelæ of scarlet fever, measles and whooping cough on the other. While we can understand how a toxin, generated or developing in the course of an infectious disease, may so involve the nervous mechanism as to produce paralysis in one instance and chorea in another, it is incredible to assume that a similar toxin, like the sword

of Damocles, is constantly impending over the rising generation, ready to "strike in" on the slightest provocation—fright, over-study, over-play, or physical exhaustion. Such a doctrine is monstrous in its conception—by far too fatuous for modern science.

In the case of arterio-sclerosis, hardening of the arteries with defective nutrition, as it (chorea) occurs in adult life, of course, we have an entity, something tangible, in the form of an obstruction to the uninterrupted transmission of nerve impulses; but there is no satisfactory explanation forthcoming which will account for the counterpart of the symptoms in childhood without perceptible anatomic lesion. In consequence, therefore, of this gradually increasing agglomeration,¹ of chameleon-like theories, it will be the object of the present article to develop a fundamental basis for the rational treatment of the disease—exact from a scientific viewpoint and practical from a clinical standpoint, thus bringing order out of chaos, "a consummation devoutly to be wished for."

Definition.—A functional (?) nervous disorder, usually occurring in childhood. Symptoms, irregular, muscular contractions (twitching).

Causative Factors.—Naturally, our first inquiry will relate to the causative factors. What evidence is there favoring the suggestion of an anatomic lesion? Is there a substantial basis for assuming that the disorder is purely functional, simply a derangement of the physiologic equilibrium? Again, the peevishness, irritability, and general tendency to misconduct (tantrums) of these children might lead to the inference that chorea was of psychologic origin; in fact, the consecutive appearance of hysteria in many of these cases lends suspicion to this theory. For example, we learn from text-books that hysterical attacks are "explosions of nerve force" ("brain-storms?"), and the irritability of choreic children is merely a reproduction of hysterical manifestations in milder form.

¹ An orderless mass; an indiscriminate assemblage; heap, cluster.

What is the basis for this assumption? In chorea it is taught that there has been "strain," that the nerves are "shattered," and the patient a "nervous wreck." How then is it possible for the explosions to occur when the ammunition has been exhausted?

Fortunately, a better explanation is at hand—one which is physical or chemic, but entirely separate and apart from both physiology and psychology. Thus, when a trolley car with over-head wires runs over a wet rail that has been "sanded," sparks from the wheel fly in every direction—the sand being a non-conductor, the car is partially insulated, owing to the obstruction in the transmission of the electric current. So it will be shown that the so-called strains, nervous wrecks, tantrums, brain-storms, explosions and hysteria, one and all alike, are due to demonstrable obstruction in the transmission of the nerve impulses. The insulation may be partial or complete—anatomic lesion?—depending upon the susceptibility of the structures involved—physiologic deviation?—while the nervous derangement—psychologic defect?—will usually depend upon the degree or intensity of involvement, although this is not invariably a reliable criterion. In general, however, the proposition holds good, that all deviations from normal in nerve conduction are the same in kind and differ only in degree, the evidence being more fully brought forward later on in this article. The solution of this question hinges entirely upon the chemic problem in nutrition.

Taking up the study of this question in a logical and impartial manner, and considering its various phases and phenomena critically and dispassionately, it will be convenient to follow the lines indicated in the chart or diagram (p. 393), "Causative Factors," which covers, practically, the entire domain, as understood at the present day.

Idiopathic.—Chorea is classed as idiopathic when it develops spontaneously, or unexpectedly, as a primary, or first appreciable or noticeable disorder. Still, a careful investigation usually brings to light certain incidental facts which furnish at least a clue to the climax in derangement

of function. Thus, we may obtain a history of fright, exhaustion from study, play, or employment—referred to as extrinsic causes. Intrinsic causes include faulty nutrition, anemia and rheumatism, while automatic chorea should not be overlooked. The latter appears spontaneously and independently of the will in the form of apparently purposive actions or movements—usually regarded as a reflex from an external stimulus, but may likewise arise from intrinsic causes and continue as a habit. I have included under this head also certain reflex causes, both extrinsic and intrinsic, injury and phimosis, together with worms and carious teeth.

Now, a word in regard to rheumatism as a cause, an untenable deduction, when it can be shown that the abnormal conditions predisposing to chorea—acid excess with diminished alkalinity of the blood and coincident or consecutive magnesium deposits involving the nuclear proteid—are precisely the conditions responsible for rheumatism. And just as long as these abnormal conditions remain, rheumatism will continue. Restore the normal alkalinity of the blood, adopt suitable measures to promote magnesium dissociation—to overcome the temporary insulation—and rheumatism will disappear as if by magic. Furthermore, this treatment is curative—provided, of course, that the normal reactions of the body fluids be maintained. My impression is, however, that most persons suffering from subacute or chronic rheumatism value it too highly to part with it. They regard it as a pet rather than an infliction, and take both pleasure and pride in nursing it, and talking about it, and studying its interminably interesting peculiarities—and not infrequently, they dilate with enthusiasm upon its unflagging persistence, as shown by the number of eminent physicians who have been utterly baffled in their most earnest solicitations to effect a cure.

It follows, therefore, that the treatment of chorea with intercurrent rheumatism will be varied or modified by the collateral medication demanded to counteract or liquefy the special toxin arising from secondary infection—prac.

tically, a concomitant of all disorders of an infectious or contagious character, as well as rheumatism, which is neither.

Septic Infection.—In all acute infectious diseases, we have to deal with sepsis arising from the special or pathogenic bacteria responsible for the disorder. In addition to this, we have what is termed secondary infection, usually streptococcus, staphylococcus, or diplococcus, a complication falling under the head of "mixed" infection, in which symbiosis often plays an important part—by either augmenting the activity or virulence of the original infection, or by diminishing or even neutralizing them entirely, so that the employment of bacteriologic products has now become a recognized scientific procedure in the treatment of various diseases, prophylactic as well as curative. Examples of this are seen in the case of diphtheria, typhoid fever, and hydrophobia, the results in such cases being lacking in uniformity—notably brilliant in many instances, but utterly useless at other times. There should be a more substantial basis established for this line of treatment than that which now prevails, *viz.*, that its value depends upon early application. In view of the well known clinical facts relating to all diseases—the persistent tendency to acidity with diminished alkalinity of the blood, which lessens its oxygen-carrying capacity, and impairs or destroys its inherent antiseptic properties—it appears logical to assume that attention to this detail would tend to insure greater certainty, while at the same time measurably increasing the efficiency of treatment.

The foregoing suggestion is offered in connection with our study of septic infection as a causative factor in the production of chorea. For example, septic infection (septicemia), gives rise to a long train of symptoms, delirium being prominent. Failure to arrest sepsis leads to pyemia (pus-formation), with chills and irregular variations in temperature, but the delirium generally subsides. Now, it is a clinical fact that in all such cases—septicemia and pyemia—alkalinization of the blood produces an immediate

and marked amelioration of the symptoms—the scientific fact has already been presented, but we cannot discuss this question further, because it opens up the subject of treatment.

Admitting that sepsis is a causative factor in the production of chorea, we want to know whether it is direct or indirect, immediate or remote? Analysis shows that sepsis affects nerve function, interfering with or destroying the capacity for the transmission of nerve impulses; hence, it follows, that sepsis produces an effect which amounts to an obstruction. Sepsis is, therefore, the medium, not the thing itself, in producing chorea. Besides, chorea persists long after septic infection has disappeared. We may be able in many instances to trace the obstruction in nerve conduction directly to the septic infection; in other cases, the sepsis gives rise to inflammatory reaction, this being followed by obstruction and choreic symptoms, when sepsis becomes the indirect cause. Thus, septic infection may be the immediate or remote cause of chorea, although this deduction gives no definite or positive information concerning the exact nature of the obstruction—a question of vast importance and grave significance.

Arterio-sclerosis.—Under the head of arterio-sclerosis as a causative factor in the production of chorea, we meet with such a multiplicity of symptoms that it seems the part of wisdom to discuss in detail the exact nature of the obstruction previously referred to. In other words, a conscientious effort will be made to elucidate the pathology of the malady, and I shall not be anticipating the evidences in favor of rational treatment by the announcement that chemic deviation alone is responsible for the appearance of chorea as well as for its persistence. Taking up the topics in order, as outlined in the chart, it will be convenient to discuss their peculiarities from this viewpoint, for the purpose of developing the fundamental basis of the chemic problem in nutrition as a guide in the treatment of disease.

Athetosis.—The belief is general that as a result of hardening of the arteries (arterio-sclerosis), we have a peculiar

choreic symptom, called athetosis. It is seen in children, also in adults after hemiplegia—paralysis affecting one side. In the first instance, it has been assumed all along that it was purely functional; following hemiplegia, we must admit that athetosis is due to some organic change in the nerve structures, some obstruction which impairs the transmission of motor impulses. Now the question arises: Is the obstruction identical in both instances? Considered from the physiologic or psychologic viewpoints, the derangement of function is identical; from the anatomic viewpoint, the condition in both cases is at least similar. Finally, we have to consider the chemic deviation—the puzzle end of the problem in which we are called upon to determine the quantitative or relative value of a known substance, magnesia.

In this analysis, it is assumed that the reader is more or less familiar with the illustrative cases previously published, showing how magnesium infiltration may occur in at least three different forms—(1) simple replacement, (2) chemic transformation, or (3) united with calcium—so that it will not be necessary to traverse this ground again. If any doubt exists as to the presence of magnesium as a disturbing factor in nerve conduction, it is only necessary to test the reflexes, the knee-jerk for example. This simple test not only applies in the cases under discussion, but is universally applicable, the claim being amply confirmed by the crucial test of clinical experience. That is, treatment conducted for the special purpose of promoting magnesium dissociation is curative—and again, we have the reflexes in evidence.

The Chemic Deviation.—Having now advanced the theory that magnesium infiltration is the essential element responsible for chorea, let us study the chemic evidence in its support, together with an inquiry as to the probable chemic nature of the obstruction (deviation), which impairs the transmission of motor nerve impulses. It will be appropriate also in this connection to account for the variations in the degree of intensity—to explain, as far as possible, from clinical observation, why some cases make a spontaneous

recovery without medical treatment, or, after treatment has proven a failure, while others, no more serious or less favorably situated, proceed to a fatal termination.

Taking the two classes or types of athetosis already cited, studying them in the abstract in connection with arteriosclerosis, I should say that replacement occurred in children, while in adults we have magnesium united with calcium—always bearing in mind the organic (colloid) nature of nerve structure. Thus, we can readily trace the development of athetosis in children—unsuitable dietary leading to indigestion with consecutive malnutrition, acid excess, perhaps nervous irritability, and finally, the characteristic movements. Should the child experience an attack of bowel trouble, with magnesium sulphate as a part of the treatment, recovery from the acute illness would show the choreic movements greatly intensified, leaving the parents and medical attendant under the impression that the illness had aggravated the malady—a grave mistake, and all too common.

All such cases, except as a result of injury or septic infection, readily respond to the rational methods well known to physiologic chemists, by which we endeavor to promote magnesium dissociation according to the law of mass action. Acid excess, having depleted the lime content of the nuclear proteid, the cellular structures, including the nerve cells, cease to perform their normal functions. As Professor Loew has pointed out, the magnesium nucleo-proteids inhibit absorption (imbibition), and for this chemico-physiologic change or transformation, the only known antidote is calcium in excess, according to the law of mass action.

Treatment conducted in accordance with the principles here laid down yields results which are little short of marvelous—of course, it is understood that proper attention is given to diet, and when necessary, to reestablishment of the normal alkalescence of the blood, without which relapses are liable to occur. As a guide to confirm diagnosis we have the exaggerated reflexes, and by the same token, we are

able to demonstrate the efficiency of treatment—in correcting the chemic deviation.

It remains to add that arterio-sclerosis, the apparent cause, has received no consideration, and that too, for the good and sufficient reason that it is merely an incidental factor and disappears when the chemic deviation in the nerve structures is corrected.

The severity or intensity of involvement is always in direct relation with the disordered nutrition, and as a rule, bottle-fed babies are more liable than those nourished at the breast. Again, when children, whose principal food consists of cereals containing a large percentage of magnesium in proportion to the calcium content, are more liable to intestinal indigestion—and chorea—than those who are fed upon what might be termed a “balanced ration.” The practical value of this suggestion will be apparent from a glance at the table which appears on page 95, and besides, it shows how the milk gets into the cocoanut.

From this tabulation we get a fairly comprehensive exposition of the inorganic constituents present in food materials generally employed or used throughout the country—for children as well as adults. Hence, the conclusions applicable to children are substantially the same for adults. A child fed upon corn meal, rice, graham bread, flaked wheat, honey and also a little meat is bound to suffer from indigestion, because of the excess of magnesia; with the addition of eggs, milk, butter or buttermilk and plain bread, with molasses or maple syrup, it would mean robust health and symmetrical development. I have included vegetables and fruits in the list, although in respect to calcium and magnesia, they are more evenly balanced—with a few notable exceptions. Their advantages are due more to the presence of organic acids, proteids, and carbohydrates than to the inorganic constituents.

Paralysis Agitans.—Under this head it will be convenient to study magnesium infiltration as it occurs in the third division adopted—magnesium united with calcium. It will not only cover the choreic movements known as athetosis,

but also the peculiar manifestations arising from involvement of Broca's convolution, known as the "writing-hand."

A case of this character was made up for publication in a former paper under the head of "agraphia," but was finally omitted because the record was incomplete. It appears now on page 299.

Huntingdon's Chorea.—From a theoretical standpoint, the causative factor in Huntingdon's chorea differs from the other two types already considered, for the reason that it affects adults or those in middle life, is gradual in its development, the irregular movements and disturbances of speech being progressive in character until we finally have dementia. Of course, there must be more or less hardening of the arteries, but preceding this abnormal condition, the probabilities are that we have involvement of the nerve supply, not only the motor and sensory nerves, but also the vasomotor nerves, those which control the caliber of the blood vessels, thus presenting a somewhat obscure symptom-complex. And yet, if we assume that this form of chorea falls under the head of the second division of our classification and is due to chemic transformation, the pathology is clear and distinct. Further, this morbid complexus being agreed upon, it reflects the line of treatment to be adopted.

Now, a word in regard to chemic transformation. The magnesium salts which are distributed through the medium of the circulation, although always in combination, must necessarily undergo chemic changes, as otherwise they would pass out from the body without change. We assume, therefore, that oxidation takes place, either through the presence of ozonized oxygen, or through the development of oxidase, a normal product of all cellular activity. Thus, we have magnesium oxide, a chemic product which combines with organic colloids in alkaline solution; that is, magnesium oxide added to an alkaline solution containing organic colloids, will give us their precipitation—and this is the only known substance which produces this effect.

Therefore, we assume that at least a portion of the magnesium salts circulating in the body are converted into

magnesium oxide, that this magnesium oxide combines chemically with the organic colloids composing the nerve structures, and that it has the same effect as simple replacement or magnesium united with calcium, and impedes, hinders, or destroys the capacity of the nerve cells to functionate. In other words, it arrests tissue change and gives us the symptoms of arterio-sclerosis as a result of this deterioration.

The treatment of these cases is, therefore, reflected by the pathology—it should aim to promote magnesium dissociation, either according to the law of mass action, or by means of chemic disintegration. Success in the treatment will be in direct relation to the physical condition of the patient as well as the length of time during which the disease has persisted, but as a rule, it will be found that reflexes are exaggerated or absent, and that the normal alkalinity of the blood is diminished—in other words, acid excess is present.

CHOREA—CAUSATIVE FACTORS (SCHEMA).

- | | | |
|--------------------------------|---|---|
| I. <i>Idiopathic:</i> | { | Extrinsic—Fright, injury, phimosis, study, play, exhaustion, employment;
Intrinsic—Faulty nutrition, anemia, carious teeth, worms, rheumatism, automatic. |
| II. <i>Septic Infection:</i> | { | Scarlet and typhoid fever, diphtheria, measles; Cholera infantum, whooping cough, ptomain poisoning. |
| III. <i>Arterio-sclerosis:</i> | { | Athetosis—Constant movement of fingers and toes (children), also seen in adults after hemiplegia;
Paralysis agitans—Shaking palsy, beginning usually in one hand, termed "writing-hand."
Huntingdon's chorea, of adult or middle life—Irregular movements, disturbances of speech, and gradual dementia;
Hysterical chorea—Oscillatory movements and chorea insaniens (maniacal chorea), seen in adult women and usually ends fatally;
Writer's cramp, four forms, spastic, neuralgic, tremulous and paralytic—also occupational. |
| IV. <i>Pregnancy:</i> | { | Sepsis—Auto-toxemia from intestinal tract, or due to disordered innervation, involving the liver, kidneys, or cerebral centers;
Magnesium infiltration—Due to lime depletion with acid excess, wasting of bone structures and perhaps uremic convulsions. |

Hysterical Chorea.—In view of the arguments advanced, it seems doubtful if we can identify hysterical chorea as an hereditary disorder—it would be in keeping with the obsolete teachings in respect to consumption and tuberculosis, when these terms were regarded as interchangeable and little doubt existed as to the hereditary nature of the disease. Besides, we have this form or type of chorea in the absence of hereditary influence.

As to maniacal chorea, it would be unprofitable to enter upon an academic discussion. We have in our midst quite a number of public institutions where such cases are under observation, with physicians in attendance who would gladly (perhaps) extend the advantages of this treatment to such unfortunates. Surely, no serious harm would befall them, and very little risk attend the administration of a few grains, more or less, of calcium carbonate (vitalized chalk), or calcium sulphate (gypsum), and certainly not, if they were imported and marked, "Made in Germany."

Writer's Cramp.—This is strictly an occupational disorder, included among, perhaps, twenty others of like character, and is as clearly due to magnesium infiltration as neuritis, neuralgia, and shaking palsy—the proof being found in the clinical results attending treatment.

Pregnancy.—There is ample room for an elaborate discussion on pregnancy as the causative factor in the production of chorea, either from the viewpoint of sepsis, or as a result of disordered innervation arising from lime depletion, but it is believed sufficient evidence has been advanced to warrant a preliminary investigation—the which reminds me to add a biblical quotation, "Except ye believe Moses and the prophets, ye will not believe me."

Rational vs. Scientific (?) Treatment.—Oliver Wendell Holmes has been roundly abused for his sweeping denunciation of all medicines, consigning them individually and collectively to the sea—for the benefit of mankind, although worse for the fishes—but he was excusable, since his ukase was promulgated long before the discovery of magnesium infiltration and its important bearing upon the chemi-

problem in nutrition. Thus, hope beckons to the future, while memory links us to the past.

Reference to the accompanying chart or plot shows the vivid contrast between rational treatment, based upon the unerring laws of chemistry, and the conglomeration of heterogenous material offered by so-called scientific medicine—resting upon the rather shifty support of theory and tradition. Chemic treatment is simple, definite, and demonstrable—concise, exact, compact; theoretic treatment, on the contrary, is changeable, complicated and unreliable—diffuse, indefinite, adversative. It has lost momentum, coming to a full stop, like an engine on a dead centre, and nothing short of an Archimedean screw (made in Germany?) will arouse the profession from its lethargy.

CHOREA—RATIONAL *vs.* SCIENTIFIC (?) TREATMENT

<i>Rational:</i>	{ Carbonate;
(Chemic)	{ Iodo-calcium, or iodide;
Calcium Salts	{ Sulphate.
<i>Scientific (?)</i> :	{ Asafetida, arsenic, acetyl-salicylic acid, anti-
(Theoretic)	{ mony, anilin, antipyrin, apomorphine, amyl nitrite;
External	{ Baths (mineral water), belladonna, blisters (to spine), bromural, bromides—ammonium, iron, potassium, sodium, strontium and zinc;
and	{ Cannabis indica, cimicifuga, cod-liver oil, cold (applications), copper sulphate, chloroform, chloral hydrate, codeine, conium, chloretone, curare;
Internal	{ Exalgine, electricity, emetics, ether spray, ergot;
	{ Hyoscyamus;
	{ Iron;
	{ Lobelia;
	{ Morphine, musk;
	{ Picrotoxin, physostigma;
	{ Quinine;
	{ Sodium salicylate, strychnine, silver;
	{ Trional;
	{ Valerian, veronal, veratrum viride;
	{ Water (affusions);
	{ Zinc sulphate.

The ancient geographers, in making maps, included the territory so far as known to them, and to indicate the dangers incident to further exploration, they wrote just outside the margin, "*Hic sunt leones*," as a warning to their competitors as well as their successors. Following their example, I should also write, "Here are lions," along the margin of this chart—to indicate the limitations of strictly clinical observation, believing that scientific inquiry will not only greatly extend the horizon, but also that it will enable us to deal with the various questions coming up with greater accuracy, in short, with mathematical precision.

Rational Treatment.—In making up our therapeutic diagnosis we must, of course, exclude reflex irritation, both internal and external. Faulty nutrition is indicated by anemia, mucous catarrh, together with symptoms of rheumatism, but this is not all; we must study the condition of the skeleton by attention to the conformation of the cranium; we must also inquire as to the condition of the spinal vertebræ—whether there are symptoms of spondylitis, kyphosis, lordosis, or curvature. Struma is usually indicated by prominent abdomen together with hollow back, and along with this we have, perhaps, bow-legs, or flat-foot. The chemic deviation is not always discoverable. By testing the saliva with blue litmus paper it is an easy matter to confirm the suspicion of acid excess, or by testing the reflexes, the knee-jerk, for example. An unusual mental activity or deficiency should be regarded as suspicious factors indicative of magnesium infiltration.

This data is indicated in the accompanying chart headed, "Rational Treatment," and will serve a useful purpose in making a preliminary examination in the case of chorea.

Under the head of *Septic Infection* as a causative factor in the production of chorea, we have but a limited number of indications for treatment, as it is all-important that suitable measures be taken for the purpose of improving metabolism, that is, primary and secondary assimilation. Next in order comes acid excess as a factor which indicates a

demand for suitable measures to restore the normal alkalinity of the blood, to the end that it shall be efficient from an antiseptic viewpoint.

Lastly, we shall have to consider the measures or remedial agents which will promote magnesium dissociation. In recent cases, where the patient is fairly well nourished, the probabilities are that we have to deal with replacement, arising from a diminished alkalinity of the body fluids, a condition which is readily overcome by the employment of calcium salts, carbonate or sulphate, in order to secure chemic dissociation according to the law of mass action. When the disorder has continued for months or years, it is doubtful if this simple measure will be effective, inasmuch as we have to contend with chemic transformation—in other words, the presence of magnesium oxide has given rise to a new chemic product which can only be modified or dissolved through the influence of some chemical which will cause disintegration by acting upon its organic constituents, and this remedial agent is found in iodo-calcium.¹

In view of the fact that this chemic substance may itself produce irritability of the nervous system, it must be given with caution, and it is frequently advisable to give it in alternation or conjointly with one or the other calcium salts already mentioned. Sometimes good results follow the use of iodo-calcium for one week, followed the next week by calcium carbonate or calcium sulphate, the latter being especially indicated when we have to deal with wasting of bone, such as rarefying or condensing osteitis, the former when the soft tissues show relaxation.

¹ The name iodo-calcium is employed to distinguish it from the chemic product, calcium iodide. It is a simple mechanical mixture of iodine with calcium oxide, one part to ten (IX trituration). For medicinal purposes, I think favorably of using the normal trituration, that is, equal parts of iodo-calcium and sugar of milk, so that the finished product might be termed a decinormal trituration. In consequence of the presence of iodine, this remedy should be given only when the stomach is empty, to avoid the formation of iodide of starch, and I think it is best given in the form of tablet triturates, each to contain say one-half grain of the decinormal trituration. Thus, we avoid any irritation from concentration, and we also secure immediate solution and prompt absorption.

RATIONAL TREATMENT OF CHOREA—EPITOME.

- | | | |
|--------------------------------|---|---|
| I. <i>Idiopathic:</i> | { | Remove reflex irritation—Worms, carious teeth, phimosis, injury;
Improve faulty nutrition—Anemia, mucous catarrh, rheumatism;
Correct chemic deviation—Neutralize acidity, promote magnesium dissociation. |
| II. <i>Septic Infection:</i> | { | Improve assimilation, primary and secondary;
Neutralize acid excess—Restore normal alkalinity of body fluids;
Promote magnesium dissociation: { Simple replacement;
Chemical transformation;
United with calcium. |
| III. <i>Arterio-sclerosis:</i> | { | Restore the digestive capacity;
Neutralize acid excess;
Promote magnesium dissociation. |
| IV. <i>Pregnancy:</i> | { | Restore the digestive capacity—Improve metabolism;
Neutralize acid excess—Restore normal alkalinity of body fluids;
Promote magnesium dissociation: { Simple replacement;
Chemical transformation;
United with calcium. |

In the case of adults suffering from choreic manifestations, along with the symptoms of arterio-sclerosis, alternation is the most desirable plan, and of course, it is important that proper attention should be given to the digestive apparatus. Generally, however, in this class of cases, that is, in the case of adults, we have to deal with chemic transformation together with calcium as a complication, and the diminished alkalinity of the blood requires first attention. In fact, it is the only successful method when it is desired to secure permanent results. In these cases, acid excess becomes a "habit," and while the administration of iodo-calcium will produce immediate and marked improvement in the symptoms, relapses almost invariably occur.

In the case of chorea associated with pregnancy, from sepsis or pathologic changes, the indications for rational treatment are developed in the chart in connection with the foregoing *resumé*, so that it is a mere matter of detail to

carry out the plan of treatment. Special emphasis should be laid upon the different phases mentioned, the salivary reaction and the reflexes, and it will be found, as a rule, with comparatively few exceptions, that as these reactions approach normal, symptoms will subside. In other words, improvement is in direct relation with the reëstablishment of normal chemic reactions.

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